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The Public Health Journal

JANUARY, 1928

VOLUME XIX NUMBER 1

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The Public Health Journal

Vol. XIX JANUARY, 1928 No. 1

THE MENTAL HYGIENE MOVEMENT

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MENTAL hygiene is difficult to define. It is easier to talk about its various aspects than to give it a generally accepted definition. It may be provisionally described as a movement whose aim is the promotion and preservation of mental health. It is therefore concerned with the prevention of mental disease, mental defect, delinquency, and the many milder forms of social maladjustment and inefficiency which are the sources of so much unhappiness and discontent. In a sense the mental hygiene movement is a part of the more general public health movement. Dr. Vincent, President of the Rockefeller Foundation, in a public lecture in Montreal, said: "A very significant and important thing to remember is that the various hygienes, the control of communicable disease and the sanitation of the environment are all part of one movement. The idea that you can touch any of them, that you can deal with or dwell on one to the exclusion of the others—the idea that you can develop any one of them very far until you have developed the others is one of the great fallacies, and what is termed mental hygiene permeates all the other hygienes."

The history of mental hygiene is a comparatively short one, beginning about 1908. It is closely associated with the career and work of C. W. Beers, who describes his many interesting experiences in his book entitled "A Mind That Found Itself". Beers was born in Connecticut and graduated from Yale University in 1897. After graduation he first took up a business career and spent three years in various business offices. During this period a nervousness from which he had suffered for some time became exaggerated, and in 1900 he attempted suicide by jumping from a third storey window of his home. He was taken to a hospital suffering from minor bodily injuries. From these he soon recovered, but he spent the next few years of his life in various hospitals for the insane. While in these institutions he was repeatedly shocked at the treatment accorded to various patients, and he decided to investigate the situation as thoroughly as possible. With this idea in mind he contrived to behave so badly that he was sent from ward to ward and experienced the most drastic treatment that was then accorded to the insane. He soon became convinced of the necessity of reforming these institutions. This idea became almost an obsession, and he spent much of his time in the formulation of plans. After many vicissitudes which are fully described in his book, he

finally recovered from his mental malady. He then proceeded to carry out his plan for a mental hygiene movement which would eventually encircle the globe.

Beers received the assistance and encouragement of many of the leading psychiatrists and philanthropists, and the first Committee for Mental Hygiene was organized in Connecticut in 1908. This was followed by the American National Committee in 1909. A rapid development of the movement ensued, and many states and cities organized their own committees to deal with their own local mental health problems. The movement spread to other countries. The Canadian National Committee for Mental Hygiene was organized in 1918 by the late Dr. C. K. Clarke and by Dr. C. M. Hincks, who is the present Medical Director. Since that time organizations for mental hygiene have been inaugurated in many countries, especially in South America and Europe. In 1922 an International Committee for Mental Hygiene was organized as a sort of clearing house for information collected by the various national committees. C. W. Beers, who has been secretary of the American Committee since its beginning, was also made secretary of the International Committee. Thus, in a sense, Beers' dream of a world-wide movement for mental hygiene has been fulfilled.

The original aim of the mental hygiene movement was to improve conditions in the various institutions for the insane and feeble-minded. In this it has been distinctly successful. The methods of dealing with these patients have been revolutionized, asylums for the insane have become in reality hospitals for the mentally diseased, and many new and greatly improved institutions have been built. In conjunction with this original aim, a programme of public education was undertaken with the object of improving the attitude of the general public towards the mentally diseased. The old theory of possession by demons had left its traces on the public mind, and consequently a certain stigma was still associated with mental disease. It was necessary to get the public to see that mental disease was in the same class as physical disease, and that it was no worse to suffer from dementia praecox, for example, than from tuberculosis. This aim of mental hygiene has also been very nearly attained. At the present time no special stigma is attached to mental disease, except in the more unenlightened circles.

In the beginning mental hygienists had also an important task to perform in bringing pressure to bear upon state or provincial legislatures to appropriate funds for more and better institutions for the feeble-minded. Surveys were made to show the number and condition of the feeble-minded in the community, and statistical studies were made to demonstrate the benefits which would accrue to the state from their segregation or proper training. It was pointed out that feeble-mindedness is really a matter of degree; that the least intelligent mental defectives require segregation in institutions and state support, while the more intelligent, the so-called morons and even some imbeciles, may, as a result of proper training, become at least self-supporting, if not an actual asset to the community. This led to a campaign for schools

for the training of the feeble-minded, and also for special classes for backward children in the ordinary schools. It is believed that proper social and vocational training in childhood will enable many of the higher grade mentally defective persons to take their place in the life of the community as contented and self-supporting citizens.

The statistics gathered for this campaign of public education were startling in their significance. The appalling number of mentally defective individuals had not previously been fully appreciated. It was found that more than one per cent. of the total population should be classed "feeble-minded". The vast majority of this army of more than one million persons in the United States and Canada are, of course, not in institutions, and many of them with the proper training need never be placed in institutions. On the other hand, many are at large for whom institutional care is an urgent necessity, and it is particularly true in Canada that there is a crying need for more institutional accommodation for the low grade mentally defective. The statistical studies also showed that about four per cent. of the population at one time or another suffer from some form of mental disease for which they need special treatment or advice. In other words, out of every one hundred children attending school four of them will some time consult or need to consult a mental specialist. While it is true that the majority of these are mild or recoverable cases the situation is nevertheless sufficiently serious to demand a greater measure of public attention.

These astounding facts led the mental hygiene workers to a consideration of the problem of prevention of mental disease and mental defect. Prevention is only possible if we know something about causes. The study of causes is the task of science. Mental hygiene organizations therefore undertook to encourage various sciences in the investigation of these problems. The sciences chiefly concerned are psychiatry, psychology, physiology, and sociology; and a new impetus was given to these sciences as a result of the mental hygiene movement. They have all contributed much to a better understanding of mental health during the last ten years, and have thrown new light on the problems of prevention and treatment of mental disorders. These contributions can only be referred to in a general way. Psychiatrists have made many studies on the nature of mental disease, its pathological anatomy, its inheritance, its treatment, and so forth. Both psychologists and psychiatrists have tried to show the importance of the mental factors involved in the origin and development of mental disease and have emphasized the importance of the milder disorders and maladjustments which do not usually require hospital treatment. Their point of view is very well expressed in the following quotation from Dr. C. Macfie Campbell:*

"Mental hygiene is not concerned merely with those serious forms of mental disorder which require treatment in state hospitals; it is concerned with those other forms of mental disorders which do not necessarily mean the removal of the individual from his ordinary social environment. A disorder

*Mental Hygiene, July, 1921.

is a mental disorder if its roots are mental. A headache indicates a mental disorder if it comes because one is dodging something disagreeable. A pain in the back is a mental disorder if its persistence is due to discouragement and a feeling of uncertainty and a desire to have sick benefit, rather than to put one's back into one's work. Sleeplessness is a mental disorder if its basis lies in personal worries and emotional tangles. Many mental reactions are indications of poor mental health, although they are not usually classified as mental disorders. Discontent with one's environment may be a mental disorder, if its cause lie, not in some external situation, but in personal failure to deal with one's emotional problems. Suspicion, distrust, misinterpretation, are mental disorders when they are the disguised expression of repressed longings, into which the patient has no clear insight. Stealing sometimes indicates a mental disorder, the odd expression of underlying conflicts in the patient's nature. The feeling of fatigue sometimes represents, not overwork, but discouragement, inability to meet situations, lack of interest in the opportunities available. Unsociability, marital incompatibility, alcoholism, an aggressive and embittered social attitude, may all indicate a disorder of the mental balance, which may be open to modification. Acute phenomena characterized by unreasoning emotional reactions, such as lynching and other mob reactions, waves of popular suspicion sweeping over a country, may be looked upon as transitory disorders. The same factors that are involved in these familiar reactions play an important part in the development of insanity."

The physiologists have also contributed to the work of mental hygiene in their studies of functions of glands and of the autonomic or vegetative nervous system. The work of Cannon and others has shown the bearing of internal secretions upon the mental life of the individual, and especially the relation of internal secretions to emotion, which is of primary importance in many mental diseases. The sociologists have made studies on the environmental factors associated with mental disease and mental defect, and have given some very convincing evidence of their importance.

At first the results of investigations seemed to lay special emphasis upon heredity as the chief cause of mental disease and defect. More recent studies have, however, resulted in a change of view. The present tendency is to regard environment influences, especially those of early life, as the chief causes not only of mental diseases, but even of a large proportion of mental defect. Two developments in modern mental and social sciences have helped in this direction. One is psychoanalysis, which maintains that early childhood experiences are the chief factors in the causation of the so-called psychoneuroses or minor mental diseases which are characterized chiefly by such things as morbid impulsions, fears, anxieties, emotional instability and the many symptoms of hysteria. The second is behaviouristic psychology which likewise emphasizes the early influences which lead to the acquisition of the first habits of life. These early habits determine one's general attitude towards life; and undesirable attitudes may be acquired which may lead to social maladjustment and some forms of mental disease.

The importance of environment as a cause of mental disease has been emphasized again in a number of papers read at a recent meeting of the American Psychiatric Association in Cincinnati. Dr. L. Vernon Briggs of Boston, reported an interesting investigation. He has collected facts on 28,000 people who died in the past fifty years in the sand dune shore country of Cape Cod. This fishing region has had practically all American stock for generations. Records of doctors, churches, courts, hospitals, even old gravestones with frank statements of suicides and diseases have been laboriously searched for clues to insanity. Over 3,000 deaths from diseases of the central nervous system were found, and over 1,000 had been in a state hospital for mental disease. Only 18 per cent. of the 1,000 were descended from insane parents, and only 37 per cent. had any insane relatives. This investigation, which has taken fifteen years, is the first to study insanity through several generations in a community. Other papers were read at this meeting showing the importance of environmental factors in the production of epilepsy, delinquency, and other forms of maladjustment.

The study of the causes of mental disease led very soon to a study of the causes of crime and delinquency. Thoroughgoing investigations on delinquency have been carried out in recent years. Notable among these are the studies of William Healy of Boston, and Cyril Burt of London, England. The results of the many investigations have shown that the factors which contribute to juvenile delinquency are various and manifold. Most crimes can be classified as juvenile delinquency because the majority of crimes are committed by persons under 25 years of age. It has been shown that the causes of delinquency are in part the same as the causes of mental disease. These causes may be summed up as follows: (1) Physical factors, such as malnutrition, sensory and motor defects, disorders of glands of internal secretion, and various other ailments. (2) Mental factors, such as abnormalities of instinct and emotion, mental conflict, repression, early acquired habits and associations and subnormal intelligence. (2) Home conditions, such as poverty, unsanitary conditions, abnormal or immoral parents, deficient and misdirected discipline, and ill-treatment or its opposite, over-indulgence. (4) School conditions, such as wrong grading, undesirable attitude of teacher, and a curriculum not adjusted to the individual needs of the child. (5) Neighbourhood conditions, such as slums, influence of gangs and lack of social outlets. (6) Occupational conditions, such as work that is not suited to the capacities and interests of the individual, monotonous work, and other influences of the workshop or factory.

Striking evidence that a large proportion of boys and girls who go wrong might have grown up into good citizens if their home life had been different is given by Dr. Healy in a paper read before the Psychiatric Association in Cincinnati. He had followed the careers for ten years of 500 children who were taken from their own inadequate homes and placed with foster parents. All the children were considered extremely difficult behaviour problems. Ninety per cent. made good in their new homes, thus showing the importance

of environment in the behaviour of children. Other evidence in the same direction is the fact shown by several studies that from sixty to seventy per cent. of delinquent boys and girls come from homes that are broken by the death of one or both parents, by divorce, separation, or desertion.

The Mental Hygiene Committee was one of the first agencies to advocate the establishment of juvenile courts in which the usual legal procedure is curtailed or mitigated, and the offender is given a thorough physical and mental examination. At the present time it is considered a poor court that does not use a psychiatrist or psychologist who is able to assist the judge in interpreting a given case, and to assist the probationary officer when the child is placed on parole. Mental hygiene has also advocated the reformation of methods for dealing with adult criminals, and the use of probation and parole in these cases as well as with children. In the United States some of the large prisons now have a psychiatrist as a regular member of the staff.

All this work of prevention of mental disease, crime, and delinquency has drawn attention to the importance for mental hygiene of the study of childhood. Since mental disease and maladjustment frequently have their beginning in childhood, it is necessary that we should know more about the mental and physical development of the normal child, and about the various factors which may interfere with the normal or desirable course of development. There are now in the United States and Canada many organizations and individuals devoted to the study of childhood in its various aspects. A number of these concern themselves particularly with the so-called "problem child" and many things have been discovered regarding the cause and treatment of various childhood problems which have from time immemorial been a great source of worry to conscientious parents. Studies have been made of such things as childhood fears, stubbornness, temper tantrums, enuresis, disobedience, lying, and general incorrigibility both at home and in school. Foremost among the workers in this field are Dr. D. A. Thom of Boston, who inaugurated "Habit Clinics" for dealing with such behaviour problems, and Professor Helen T. Woolley of Columbia University, who has made a number of investigations on child problems and normal child development. There are also a number of institutions which have been organized to study children. Among these are the Child Welfare Research Station in connection with the University of Iowa, the Institute of Juvenile Research in Chicago, and the Child Study Association of America in New York.

As the study of childhood progressed the chain of causes of mental disease and social maladjustment was traced further and further back towards childhood and infancy. The study of the so-called pre-school child became of greater importance, and the pre-school age seems now to be the golden period for the application of the principles of mental hygiene. Nursery schools, which had previously been established in England, were introduced into America; but, while in England their sole purpose was the training of the child, in America they are used as laboratories for the study of very young children. The outstanding school of this kind is the Merrill-Palmer School at

Detroit. There are now a considerable number of such schools in the United States; and there are two in Canada, one in connection with the University of Toronto, and the other in connection with McGill University.

It was soon found that if the results of these investigations are to be applied in childhood in order to prevent future mental disease, maladjustment and unhappiness, parents must be given a working knowledge of child psychology and the principles of mental hygiene. They must be trained to take a new attitude towards the child, and as this often involves a thoroughgoing change in their own personality, the task is an extremely difficult one. Mental hygiene has therefore developed a programme of parent education. This is usually undertaken as a part of the work of the nursery school, but other organizations, such as the Child Study Association of America, are also taking part in the programme.

Not only parents but teachers also must be educated into the new point of view, since many of the troubles with which we are concerned originate in the classroom. For this purpose there was developed in the United States a new profession, that of the "visiting teacher". A visiting teacher is a person who has been trained in educational methods and understands the problems of the classroom, and who is also conversant with child psychology and the principles of child guidance. The visiting teacher goes from school to school investigating the problem cases, and tries to show both teacher and parent the various factors involved in the case and how to deal with them.

The study of the behaviour problems of children or adults always involves the study of the family and personal history of the individual and his home, school, or other environmental conditions. This is the task of the social worker, and for the purpose of mental hygiene it has been necessary to develop a new type of social worker, the "psychiatric social worker". Schools have been organized to train these psychiatric social workers and some universities also have provided special courses for them. In addition to the training of the usual social worker, they are given courses in psychiatry, psychology and mental hygiene.

Courses on mental hygiene have also been introduced into a number of universities for medical students and for other undergraduates; and the mental hygiene movement has had a profound effect in developing the teaching of psychiatry in medical schools. Mental hygienists are also studying problem students in the universities. To quote Dr. Vincent: "In eight university centres psychiatrists, psychologists and mental hygienists are giving attention to undergraduates. It appears that there are many mental hygiene problems presented by college students. Undergraduates get upset in many ways, some can't study, some become bashful and retiring, others become morbid and sulky, others develop bullying habits, and so on. The mental hygienist attempts to interpret the college student's behaviour, his way of concealing from himself facts that ought to be faced. Many college students become disturbed when they first come away from home, from being great and important people in local communities to become rather modest and insignificant in the larger university setting."

Mental hygiene has thus greatly broadened its scope since its inception in 1908. It began as a movement to improve hospital conditions for the mentally diseased and mentally defective. It went on to concern itself more and more with the application of the results of modern science to the prevention of these disorders or defects. It soon found this problem linked up with problems of crime, delinquency, and the numerous minor maladjustments which cause inefficiency and unhappiness in everyday life. Since the causes of these diseases and maladjustments were traced further and further back into childhood and infancy, it devolved upon mental hygiene to encourage and promote the scientific study of the earliest period of life, and to assist in the development of the nursery school, parent education, psychiatric social work, and the visiting teacher movement. At the present time it might be said that mental hygiene is interested not only in the prevention of the various forms of maladjustment but in the development of the best possible type of personality. This aim might be called "positive mental hygiene". Mental hygiene has thus fundamentally the same object as eugenics, but unlike the latter places considerable emphasis on the influence of environmental factors. It, however, does not overlook or neglect heredity, and it may be said to include eugenics.

In Canada the mental hygiene movement has the same scope, aims, and point of view as in the United States, although it is somewhat behind that country in the achievement of some of these aims. For instance, much yet remains to be done for the improvement of hospital facilities, and the provision of institutions for the mentally diseased and mentally defective. Much has also yet to be accomplished in the development of public opinion and the dissemination of information with reference to mental disease, delinquency, and the various forms of social maladjustment. On the other hand, substantial progress has already been made in these directions as well as in the development of juvenile courts, special classes in schools for backward children, child guidance clinics, nursery schools and parent education. Perhaps at the present moment the most urgent task of mental hygiene in Canada is the education of the general public and the attempt to influence the proper authorities to provide the facilities necessary for the promotion and preservation of the mental health of the community.

"That the training of school children in all grades by thoroughly qualified teachers in the subjects of personal hygiene and the inculcation of proper habits during school life are perhaps the most important undeveloped measures for permanently improving the health and contributing to the welfare of the people."

Resolution passed at Cannes Conference,
October, 1927.

FOREST SCHOOLS AS AN ADJUNCT TO SCHOOL HEALTH

DR. F. S. BURKE
Director of Medical Services, Department of Public Health, Toronto

IN order that we may better understand this subject and the results which one hopes to accomplish through the medium of forest schools, it may be well to outline their historical development. The first municipal forest school of which we have any record, was established at Charlottenburg, Germany, in the year 1904. The first in the British Empire was at Bostall, near Woolwich, England, in 1907, and on this continent at Providence in 1908. Dr. W. E. Struthers, chief medical officer of the Board of Education from 1911 to 1914 inclusive, was greatly interested in this work and initiated the movement in Toronto. In 1913, he wrote: "We have voted $200,000 for sanatoria, a noble and laudable work, but for one life saved to a more or less precarious existence of limited efficiency, one hundred or five hundred bright young lives could be saved to a full vigour and full efficiency." Thus even at that time he was advocating placing the preventive side in a stronger position than the curative. Dr. Struthers visited the schools at Charlottenburg and Bostall, and on his return was successful in getting the Victoria Recreation Park site. The Board of Education was persuaded to start a school there in 1912. Mr. Eckhardt gave the use of his beautiful grounds; the Board of Education put $1,000 in the estimates for that year; the Toronto *Daily Star* gave $700 to supply food; the Toronto Street Railway gave free transportation morning and night. Fifty children were accommodated, and thus the forest school movement had its birth in Toronto.

The plant consisted of an open wooden dance pavilion that was used for dining and shelter in case of inclement weather. The benefit to certain selected children was so definitely established by sojourn at this school that the scheme was not only continued but expanded. Thus in 1914, the High Park Forest School was opened. The control of the health field passed to the Department of Public Health, together with the entire school medical service, in the year 1917. From that time on we have more definite data and have been able to make a closer observation of the individual child.

Let us now survey the forest school situation as it stands to-day. There are in operation two schools. Victoria Park, in the extreme south-easterly section, is situated high up on a sandy cliff overlooking Lake Ontario. The site gradually rises through a wooded grove. The grounds comprise about sixteen acres and the school cares for 220 children. There are six open air classrooms in which are taught all the public school grades, from 1st to 4th book. High Park Forest School is similarly organized and is situated in High Park, in the western section of Toronto. This school accommodates

about 260 children and has nine classes. The staff in each school consists of a principal and teachers, kitchen help and caretakers for grounds and tents. The medical supervision is supplied by the Department of Health, and consists of a nurse, who spends every morning at the school, and the medical officer of the district in which the school is situated, who visits about twice weekly.

THE ECONOMIC SIDE. Let us now examine a little more minutely certain phases of this work; its economic side, for example. It costs approximately sixteen cents per day to supply the following:

HIGH PARK FOREST SCHOOL

Salaries (being the salaries of the nurse in charge and a proportion of the salary of the district superintendent as well as that of the district clerk)	$ 273.15
Trolley Fares (children's fares)	333.00
Cartage	8.00
Laundry	259.96
Miscellaneous Other Services	47.45
Coal, etc	178.58
Food	3,221.35
Cleaning Supplies	33.32
Sheeting, etc	48.40
Drug Supplies	9.38
Printed Stationery	18.23
Ice	81.54
Kitchen and Dining Supplies	129.67
Miscellaneous Paper Goods and Sundries	66.96
Insurance	2.40
Furnishings—Pillowforms and blankets	296.50
	$5,007.89

The Board of Education maintains the salary of teachers, kitchen help and caretakers. The cost of equipment is nearly nil as old seats and blackboards are utilized that would otherwise be discarded.

It would appear, therefore, that at a per capita cost of sixteen cents per day the service is cheap and economical because we have proved time and again that one or more summers at the school provides a child with sufficient resistance to turn the scale from a chronic institutional case at a maintenance cost of $1.50 per day to a fairly healthy school child. How do we know this? We know it by comparison with other children of the same family who have not had the privilege of attending these schools and children whose parents refused to send them. We therefore believe that the scheme is sound not only from a consideration of its economical, but also from its public health aspect.

THE ACADEMIC ASPECT. Upon enrolling at the school the child is given a number which applies to everything he uses—locker, blanket, cot, washplace, tooth brush and soap box. School work is carried out in conjunction with a well regulated programme which blends hygiene and academic work skilfully together as the following outline shows:

8.45- 9.00—Teachers' preparation
9.00- 9.05—Opening exercises
9.05- 9.30—Academic work
9.30- 9.50—Morning milk
9.50-10.00—Making of beds
10.00-11.00—Academic work
11.00-11.30—Sun bath
11.30-11.40—Free period
11.40-12.00—Wash drill
12.00-12.45—Dinner
12.45- 1.00—Tooth brush drill
1.00- 3.00—Sleeping
3.00- 3.10—Putting blankets away
3.10- 3.45—Folk dancing, games, swimming, manual training
3.45- 4.00—Afternoon milk
4.00- 4.30—Academic work

The fact seems well established that with the type of children selected for these schools, the mental activity increases in proportion to the gain in general health. Mr. Tamblyn, a former principal, and others, have made a special study of this matter and are convinced of its truth.

SELECTION OF PUPILS. As the school medical officer works steadily along with his routine physical examinations he makes a list of certain children that might benefit by attendance at a forest school. In April he again sees these children and, if their physical condition still warrants, they are chosen as suitable candidates. Following the selection of the children, the parents are visited and presented with a card which they are asked to sign. An agreement is entered into, in which the parents guarantee to co-operate with the principal and the School Medical Services to send the children to school regularly. Regularity of attendance is an essential requisite. If no guaranty is forthcoming in this regard the application is refused.

Tuberculous Contacts. The types selected are, first, tuberculosis contacts—those in whom we have definite record of exposure to an open case of tuberculosis, but upon examination by either family physician or hospital clinic show no active signs. We find these children by following up the open cases reported by either physician or hospital. We also attempt to find the pre-tuberculous child. Those who are persistently more than 10% underweight, pale, nervous and subject to frequent illnesses. If a family history is obtainable there will probably be elicited evidence of an exposure at some previous time. These two types differ in that the tuberculosis contact may appear to be a big strong healthy child and found only as a result of follow-up work, while the latter draws attention to himself by his poor physical condition.

Asthma, Chorea, Malnutrition. Bronchitis and asthma are two other chest conditions that we select. Choreas of the milder form not under active treatment, and various convalescents, such as those recovering from operations or pneumonia, are admitted. In regard to malnutrition, since this is not in itself a primary disease, we try to solve the underlying problem while the child

is at forest school. Some of the causative or contributing factors are: lack of parental control, ignorance of child psychology, unfit or broken homes, abuse or neglect of children.

RESULTS. The results differ according to the condition, and since all cases are now carefully selected, our end results are achieved with almost mathematical precision. Let us, however, consider a few examples:

Tuberculosis Contacts. When these children are taken away from the source of infection for the entire day, every day except Sunday, kept under the most hygienic conditions possible, fresh air, sunshine and rest, it will probably be the turning of the ways, not towards the sanatorium but towards a normal existence.

Pre-tuberculous children. One or more summers builds these children up in general health and increases their resistance to the point where they appear to be safe. On examining some of these for a third term we have been faced with the problem of whether or not they should be refused an extra term because of their evident robust health.

Choreic children do well if they are able to stand the street car travel back and forth. All chest conditions do well, including asthmatics.

Malnourished children. These are the cases that show the most spectacular gains in weight because very often we are not dealing with a diseased child but rather a diseased environment.

EXAMPLES OF TYPICAL CASES.

Dorothy—aged 12 years, was 10 lbs. underweight on admission, sallow, stooped and listless. She gained 15¾ lbs. with decided improvement in posture and colour and became active and interested.

Evelyn—was tall, round-shouldered, pale and listless, uninterested in either work or play. Father and mother tubercular. Child had positive I.C. at Hospital for Sick Children, but no active condition found. She gained 10¾ lbs. and showed a decided improvement in general health.

Edna and Jack—These children had very large diseased tonsils—it was not possible to procure operative treatment prior to admission but it was hoped that during the term home co-operation might be secured. The parents, however, did not respond to either teacher or nurse, and as a result Jack gained 1½ lbs. and Edna ¾ lbs. in the whole six months they attended. This illustrates a point we have been striving for years to drive home, *i.e.*, that no children should be admitted with uncorrected defects. However, we always have a few admitted on compassionate grounds with the hope of stimulating action by the parents through school influence.

Arthur W.—is a boy of nine. Twice last winter this child suffered from broncho-pneumonia. He came to school in May, nervous, underweight, anaemic and too listless to show the slightest interest in the activities of the school. Often during the early summer he spent an hour on his cot before lunch, in addition to the afternoon rest period. Gradually he began to improve, and in September the teacher laughingly remarked: "Do you know that Arthur actually talks in school now!" By November 1st this boy had

gained nine pounds in weight and improved so much in every way one would scarcely recognize him as the same youngster.

Alex.—age 11 years, had been in poor condition since 1923. He was underweight, anaemic and also had chorea and an associated heart condition which necessitated this lad remaining in hospital from April until July, when he was discharged from Lakeside and recommended by the hospital physician for Forest School. Blessed with an enviable disposition this boy set about to enjoy the school. He did all in his power to regain his health, and when the forest school closed Alex was weighing 17½ lbs. more than when he entered.

Emily F.—is a child of ten. She attended forest school last year, but made little progress. During the winter term she was in school 71 days and absent 81. In May, accompanied by her little brother, she returned to forest school very reluctantly. The nurse came to know Emily, almost immediately, for at nine o'clock every morning this child would come complaining of a headache or a pain in her foot and begging to go home. We took a special interest in this child for a time, and presently a change began to take place. Emily left her little brother to find playmates for himself while she looked about for new interests. When school closed this little girl was completely changed. She laughed and played with other girls, and was proud indeed to tell you she had gained 12 lbs. and had been absent from school only six days. The little brother learned to enjoy himself with other boys and gained seven pounds.

Children are selected well in advance of school opening in order that when possible any remedial defects may be referred to the family physician or hospital for correction. The dental work should be completed and psychiatrist's report obtained when indicated. Our experience in the past has proven that an unhealthy mouth condition will nullify our efforts to make the child gain. Forest school is not for sick children since no medical treatment is given, but it is a place where we endeavour to improve the physical condition and thus increase the natural resistance to disease. We are endeavouring to reach a certain type that the family physician and hospital cannot deal with further. They do not require medical treatment, they are not convalescents, they do not need to be institutionalized, but they do require supervision of their daily habits.

Children and parents are often incompatable. This leads to incessant quarrelling and irritation, and if in such cases a child can be taken out of the family circle into a quiet well-regulated atmosphere for the greater part of each day, very creditable advances can be made in health habits. They can be taught to take all types of food that are supposed to be correct for growing children and against which the child rebels. Many a child has had to be convinced that peas, beans, carrots and turnips can be utilized as food stuffs with perfect safety. Children are great imitators. When a few non-milk drinkers stand in the ranks with 200 others that do, they soon shed their dislike, particularly when a full mug means stand fast in your place, a mug dutifully emptied means dismiss for recreation.

There are certain questions that naturally arise in connection with these schools. *Do the children have any holidays?* No, we find they do better when no holidays are taken, even two or three weeks in the country. The probability is that insufficient rest is taken together with an improper diet. As an example, Children's Day at the Exhibition is always followed by a drop in weight.

Do parents co-operate? In the majority of cases they do. It may require effort on the nurses' and teachers' part and a home visit to attempt to improve faulty home conditions, as well as interest the mother in the Home and School Club. This organization, which is powerful and its meetings well attended, often inspires mothers to take a more intelligent interest in their children. It is a means of bringing the parents into closer contact with the child's school life, and makes her feel that she is a definite cog in the community wheel.

Can the family physician utilize forest school for certain patients? He most certainly can, and some have already referred cases to the district medical officer. We are glad to give such children special consideration providing, of course, that it does not bar a more needy child from entering. It is not always possible to accommodate a child that is proposed subsequent to the opening of the school. The pupils are selected prior to the opening, the first week in May, and this group remains fairly constant throughout the summer. We believe that for the time being we have arrived at our maximum requirements in the way of accommodation. Some difficulty is also experienced with young children who are unable to go long distances by street car. In some cases we arrange that an older child or neighbour's child looks after the little ones. Some have to be refused for safety's sake.

Open Air School. It may be permissible at this juncture to show the correlation of the open air classes which differ in certain major points from the forest school. The open air classes, of which there are five in Toronto, are situated in standard school buildings and differ only from a standard class room in the type of combined desk seat, which is movable and the special arrangements of windows. The children suitable for open air schools are very similar to those selected for forest school, except that they may attend for one or more complete school years, while forest school only operates for six months, from May to October inclusive. Therefore, when children are brought forward the district medical officer must decide which type of school is most suitable.

In the open air school the children stay all day. They get a morning nourishment, a hot mid-day meal and an afternoon nourishment. They are also provided with a heavy warm coat with a hood and blankets. These are kept disinfected and washed by the Department. The children carry out a very similar routine to forest school, including a two-hour sleep after lunch. In good weather they sleep outside on a flat roof that is protected by a high parapet. On rainy days some sleep under a verandah and some in the classrooms.

Open air and forest school children do not alternate as one might expect,

for those in charge soon realized that the transferring of forest school to open air or open air to forest school would be too confusing, and would be the cause of a great many empty seats at either or both schools during the overlapping months of May and June-September and October. A few of the most needy are accommodated to fill any vacancies.

RECORDING OF WEIGHT. The result upon the child of attendance at forest school is, of course, not altogether measurable in that psychological benefit, the learning of health habits cannot be readily recorded. However, the weight record is a means of guaging one tangible result. Individual weight record cards are used by the Department of Public Health, Toronto. Each child fills in his own card with the aid and supervision of the teacher. Thus the child is stimulated to take an active and personal interest in his progress. The figures on page 17 illustrate the graphs constructed from the composite weight data of various age groups and of the entire forest school. One may note at a glance that there is an actual loss in weight during the months of June and July. This striking fact is still unexplained. Bearing on this matter I shall quote from an article prepared with great patience by Dr. Haven Emerson, Professor of Public Health Administration, Columbia University, New York City, read before the American Medical Association at Washington in May of this year and published in the Journal of the American Medical Association, October 15th, 1927. He gathered his data from Honolulu, Toronto, and New York. This wide geographic selection was, of course, done for the purpose of comparing growth under different climatic and race conditions. The weighing, measuring and charting of diet was carried out for a full year, the weighing being monthly at approximately the same time of day. The diet was carefully noted in Toronto to find out whether extra fruit and vegetables in the summer and autumn stimulated growth more than the winter diets, or vice versa.

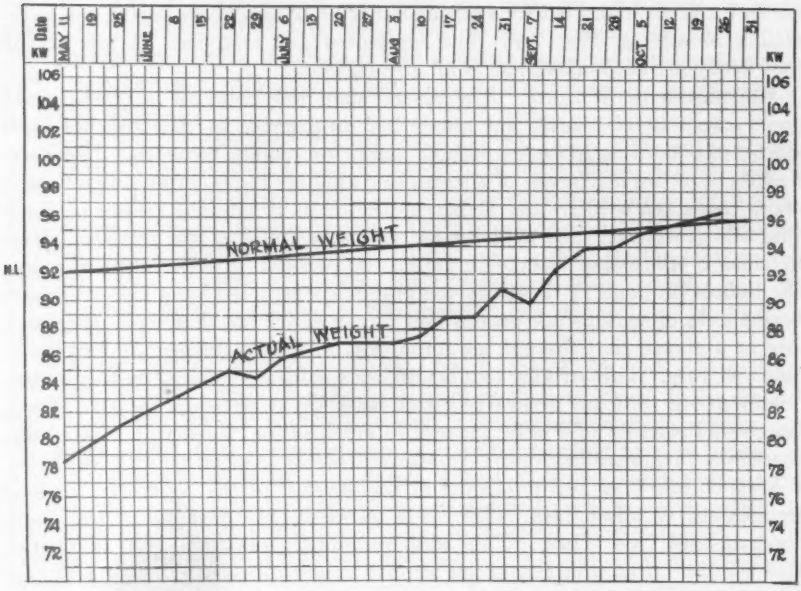
"It may be taken for granted that a drop in weight, or an arrest in weight for as much as two months, in a child of school age indicates that there are some unfavourable conditions which interfere with the addition in weight which normally accompanies increase in length of body."

CONCLUSIONS. Variations in the rate of gain in weight of children from 5 to 10 years of age are commonly observed, the rate of gain being commonly greater during the months when school vacations and favourable climatic conditions permit the nearest approach to good hygienic conditions for children, and when the incidence of acute infections affecting children is at its lowest.

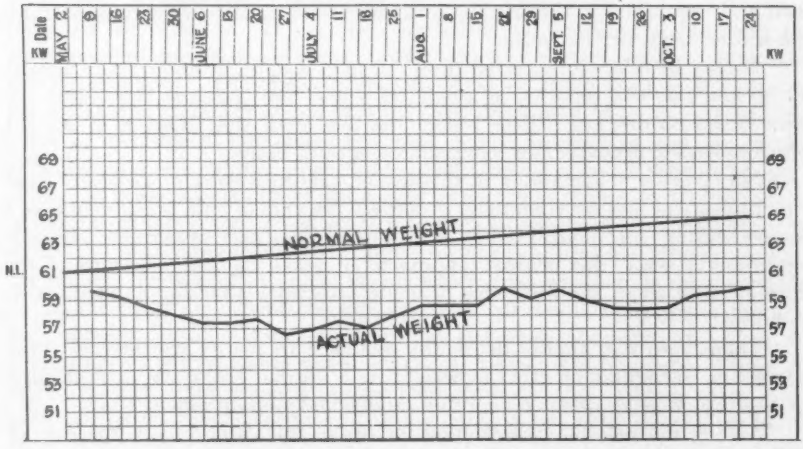
"There does not appear to be any evidence to justify considering these seasonable variations of gains in weight as a normal biological phenomenon for healthy children under favourable conditions of environment.

"Among the possible determining factors of the variations in the rate of gain in weight of children of school age in Honolulu, Toronto and New York City, the incidence of infections, particularly those acquired through the respiratory tract, is believed to be of much importance.

INDIVIDUAL WEIGHT-RECORD CARDS

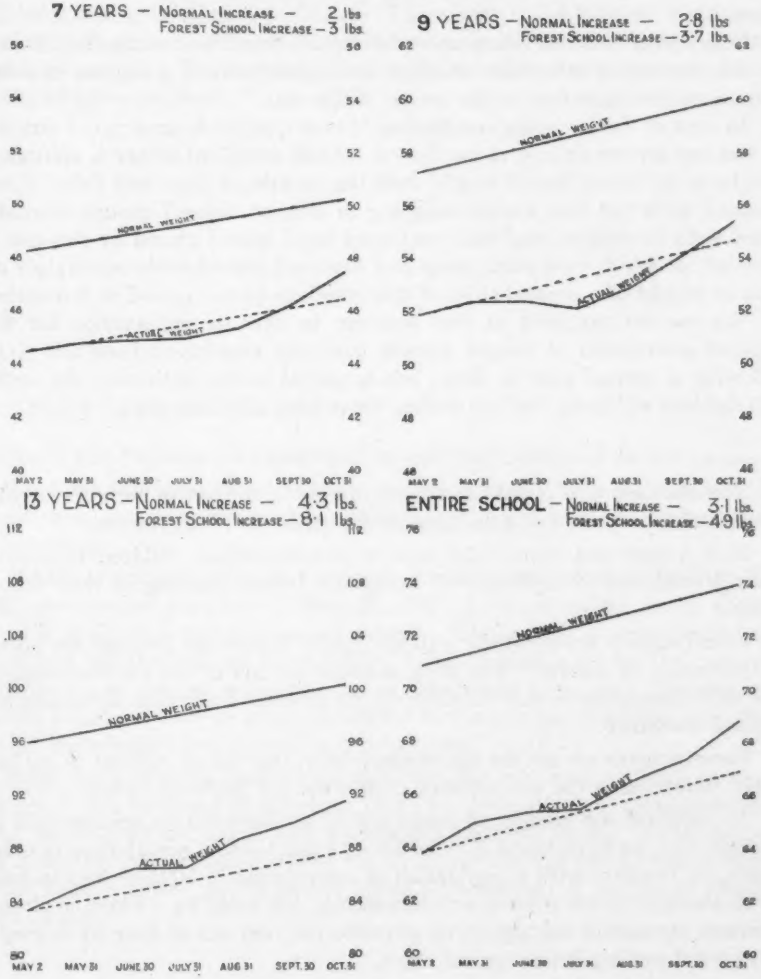


Graph illustrating record of a child without clinical defects; good parental co-operation.



Graph illustrating record of weights of a pupil with positive intracutoneous tuberculin test; father tubercular; poor parent co-operation; recommended open air school for winter and second period at forest school.

Comparison of Increases in Weight of Normal and Forest School Children for Certain Age Groups


7 YEARS – NORMAL INCREASE – 2 lbs
FOREST SCHOOL INCREASE – 3 lbs.
NORMAL WEIGHT
ACTUAL WEIGHT
9 YEARS – NORMAL INCREASE – 2·8 lbs
FOREST SCHOOL INCREASE – 3·7 lbs.
NORMAL WEIGHT
ACTUAL WEIGHT
13 YEARS – NORMAL INCREASE – 4·3 lbs.
FOREST SCHOOL INCREASE – 8·1 lbs.
NORMAL WEIGHT
ACTUAL WEIGHT
ENTIRE SCHOOL – NORMAL INCREASE – 3·1 lbs.
FOREST SCHOOL INCREASE – 4·9 lbs.
NORMAL WEIGHT
ACTUAL WEIGHT
MAY 2 MAY 31 JUNE 30 JULY 31 AUG 31 SEPT 30 OCT 31

"Seasonal or periodic variation in weight accretion of children is probably an accidental phenomenon, not necessary or euthenic in character, but an expression of unfavourable conditions affecting the child.

"A child who fails to gain in weight each month, at least up to the age of 10 years, is in all probability suffering from some form of infection or fatigue in which diet, housing and school attendance may play important contributing parts.

"Groups of children living under favourable conditions can be found who, in the absence of infectious or other sicknesses, exhibit a regular monthly gain in weight regardless of the season of the year."

In view of the foregoing conclusions, it is of interest to note that 7 out of 8 of the age groups at one of our forest schools exhibited either a stationary weight or an actual loss of weight over the months of June and July. Commencing with the first weekly weighing in August, these 7 groups started a rapid gain in weight, and this continued until school closed at the end of October, at which time each group had averaged considerably more than the gain in weight of a normal child of the same age over a period of 6 months.

We are not prepared at this juncture to offer an explanation for this decided retardation of weight growth over the months of June and July, following a normal gain in May, but a special study embracing the entire 500 children will be carried out during the coming school session.

SUMMARY.

The inclusion of a forest school programme in the health activities of any municipality is worthy of consideration for many excellent reasons.

It is a sure and economical way to restore certain children to a more normal condition of physical well-being and better standing in their school work.

Forest schools are decidedly a public health endeavour, because the object is prevention of disease. The work is based on one of the fundamentals of preventive medicine in that it builds up the physical body thus increasing the natural resistance.

Forest schools are not for the indigent only, but can be utilized to aid bad habit correction in the neurasthenic child from the sheltered home.

To estimate the amount of forest school accommodation necessary in an average city, we have found it to be about 1 per 1,000 of population, in other words, in Toronto, with a population of approximately 500,000 we can keep up to strength forest schools accommodating 500 children. There is always a certain amount of wastage to be provided for, and this is done by having a substantial waiting list at central office.

Any piece of park land well drained and free from factory smoke and dust adjacent to transportation is suitable. Too much shade is undesirable.

No permanent buildings are required, a tent being suitable for dining, cooking and shelter.

Sixteen cents per child per day will supply food, medical and nursing supervision, car fare, etc.

The public soon learn to observe the rules and refrain from trespassing within the boundaries of a school even though situated in a large city park.

The time to select suitable cases for forest school is during the winter months as it is then that observation can be made of those frequently absent with colds and other chest conditions. The winter is the time to locate and examine that particular group which loses so much time from school with chronic bronchitis. Those unfortunate children so diagnosed are particularly worthy of consideration.

ASSISTANCE TO MOTHERS.

Could this Province give assistance to mothers? Ought it do so?

Read the following letter sent to the Department by a woman who is expecting to be confined about June, 1928, and who applies to the Department for literature.

"I have already a healthy boy and girl. The boy was two years old Nov. 27, "1927 and the girl one year old Nov. 25, 1927. I did not have a doctor at the "time of their birth but just an old woman. Of course it is very unsafe but "God took me through the trials safely. I should have a doctor but poverty "will force and compel us to do a lot of things and run risks. The nearest "doctor is ten miles away which causes me to worry a lot. I will be very glad "to get these letters as they will be a help to me."

What more valuable product has this Province ever sent out than its boys and girls? Are we doing all we ought to do for the mothers of those boys and girls? In 1926 we lost one mother for roughly each 200 births. We would not lose a mother out of 500 births if the mothers received the attention they should have.—*From "Public Health Notes", Department of the Public Health, Nova Scotia.*

THE GORDON BELL MEMORIAL LECTURE ON FOOD POISONING

EDWIN OAKES JORDAN, PH.D.

Under the auspices of the Winnipeg Medical Society at Winnipeg, April 22, 1927

Professor Jordan, in the previous section of this paper, as published in the December issue, states that there are many factors which influence the character, palatability and wholesomeness of foods. He has presented the subject under the following headings:

(a) Food Idiosyncrasy—showing how the body becomes sensitized to particular protein substances.
(b) Poisons in Food—emphasizing the danger of such food as the poisonous variety of mushroom, etc.
(c) Accidental Introduction of poisonous substances into food.
(d) Food Preservatives.

The question of food-borne infections is then completely dealt with, as is also the relation of animal infections to food poisoning in man.

EDITORIAL COMMITTEE.

Two typical outbreaks that I have cited elsewhere[1] may be quoted in illustration:

"Kaensche[2] describes an outbreak at Breslau involving over eighty persons in which chopped beef was apparently the bearer of infection. The animal from which the meat came had been ill with severe diarrhoea and high fever and was slaughtered as an emergency measure (*notgeschlachtet*). On examination a pathological condition of the liver and other organs was noted by a veterinarian who declared the meat unfit for use and ordered it destroyed. It was, however, stolen, carried secretly to Breslau, and portions of it were distributed to different sausage-makers, who sold it for the most part as hamburger steak (*Hackfleisch*). The meat itself presented nothing abnormal in color, odor, or consistency. Nevertheless, illness followed in some cases after the use of very small portions. With some of those affected the symptoms were very severe, but there were no deaths. Bacilli of the *Bacillus enteritidis* type were isolated from the meat.

"A large and unusually severe outbreak reported by McWeeney[3] occurred in November, 1908, among the inmates of an industrial school for girls at Limerick, Ireland. There were 73 cases with 9 deaths out of the total number of 197 pupils. The brunt of the attack fell on the first

[1] "Food Poisoning." Chicago, 1917, p. 58.
[2] Ztschr. f. Hyg., 1896, 22, p. 53.
[3] Brit. Med. Jour., 1909, 1, p. 1171.

or Senior class, comprising 67 girls between the ages of thirteen and seventeen. Out of the 55 girls belonging to this class who partook of beef stew for dinner 53 sickened, and 8 of these died. One of the two who were not affected ate the gravy and potatoes but not the beef. Some of the implicated beef was also eaten as cold meat by girls in some of the other classes, and also caused illness. Part of the meat had been eaten previously without producing any ill effects. "The escape of those who partook of portions of the same carcass on October 27 and 29 [five days earlier] may be accounted for either by unequal distribution of the virus, or by thorough cooking which destroyed it. Some of the infective material must, however, have escaped the roasting of the 29th, and, multiplying rapidly, have rendered the whole piece intensely toxic and infective during the five days that elapsed before the fatal Tuesday when it was finally consumed.' The animal from which the fore quarter of the beef was taken had been privately slaughtered by a local butcher. No reliable information could be obtained about the condition of the calf at, or slightly prior to, slaughter. The meat, however, was sold at so low a price that it was evidently not regarded as of prime quality. In this outbreak the agglutination reactions of the blood of the patients and the characteristics of the bacilli isolated showed the infection to be due to a typical strain of *Bacillus enteritidis*."

It is highly significant that most outbreaks of this type have been due to the use of meat from an animal known or suspected to be ailing at the time of slaughter. The thrifty European peasant, noticing that one of his farm animals is out of condition, kills it "to save its life" and avoid loss. The recognition that the bodies of animals dying a natural death are not altogether fit for food is very ancient. The 21st verse of the 14th chapter of Deuteronomy reads: "Ye shall not eat of anything that dieth of itself: thou mayest give it unto the sojourner that is within thy gates that he may eat it; or thou mayest sell it unto a foreigner." It is also noteworthy that raw or partly cooked portions of the animal have proved more likely to cause illness than thoroughly cooked portions and that there is often no appearance of abnormality in the meat itself. This latter circumstance greatly increases the difficulty of preventing food poisoning by any system of meat inspection. In the Ghent outbreak of 1895 a veterinary surgeon who was slaughter-house inspector was firmly convinced that the meat which he had passed could have had no connection with the outbreak and ate several pieces to demonstrate its wholesomeness, an experiment that had a tragic ending, as the inspector was shortly afterwards attacked with severe choleraic symptoms and died five days later, paratyphoid bacilli being found at necropsy.

For a time great confusion existed about the bacilli responsible for the various outbreaks of meat poisoning, many writers, particularly certain German investigators, confounding the meat poisoning bacilli with the bacilli that cause human paratyphoid fever of the B type. In

an attempt to clear up some of the uncertainties, I have had under investigation for a number of years a collection of several hundred strains of exactly known origin. It appears to be true that the majority of meat poisoning outbreaks that have been adequately investigated bacteriologically are due to one of two organisms—either to B. enteritidis (Gärtner's bacillus) or to B. aertrycke, an organism that is closely related to B. paratyphosus B (B. schottmülleri) which causes paratyphoid fever, but is clearly separable from it by cultural and immunological tests. English bacteriologists for a time mistook B. aertrycke for B. suipestifer, a common member of this group in swine. A certain specialization with respect to animal hosts seems to be in progress in this large and unstable group of microbes. B. paratyphosus A infection, so far as known, is confined to man; B. abortivo equinus to the horse; B. suipestifer to swine. B. aertrycke is less restricted; it seems to be commonly present in infections of calves and adult cattle, but has been also found in sheep epidemics and in some rodents. B. enteritidis has been found in cattle, in swine and in rodents. B. paratyphosus B (B. schottmülleri), like B. paratyphosus A, has been isolated chiefly in connection with human paratyphoid fever, but it—or an organism hardly separable from it—has been occasionally isolated from swine although it is not known to cause natural infections in those animals.

In their relation to food poisoning, as has been said, the two most important types appear to be B. enteritidis and B. aertrycke; B. suipestifer has been found in a few cases; the equine strain has never been definitely reported in connection with food poisoning, although at least two outbreaks due to horse meat have been recorded in Germany.[1] The two human types (A and B) sustain the same relation to human infection that the typhoid bacillus does—that is, they are of human rather than animal origin and when they cause disease in man seem to be always derived from human sources. So far as epidemiological significance is concerned, they thus occupy a position somewhat apart from the other members of the group.

To the two types of infection with members of the paratyphoid group already mentioned—(1) human infections transmitted by direct or indirect contact; (2) food derived from animals suffering from paratyphoid infection—must be added a third, (3) food contaminated by animal carriers of paratyphoid bacilli. Examples of this third type occur in the contamination of food by rats and mice. These rodents are liable to individual infection and also to extensive epidemics, sometimes from B. enteritidis, sometimes from B. aertrycke. Among these animals in a state of nature carriers are found not infrequently. Elisabeth Verder in the University of Chicago, who has examined the bodies of 114 freshly

[1]The causal organism was not certainly identified in either case: Federschmidt: München. med. Wchnschr., 1920, 67, p. 814; Harms, München. med. Wchnschr., 1926, 73, p. 777.

caught wild rats in localities where rat virus had not been used, isolated B. enteritidis in 5 animals, B. aertrycke in one.

Direct evidence of rodent contamination in a given case of food poisoning may be difficult to secure. The relatively large number of outbreaks of food poisoning in which B. enteritidis or B. aertrycke has been found and in which careful investigation has failed to secure evidence either of human contact infection or of the use of food from ailing animals leads, however, to the suspicion that the contamination of food by rats and mice may be of fairly frequent occurrence. This suspicion is strengthened by the existence of a number of recorded instances in which the careless use of bacterial rat viruses has led to outbreaks of food poisoning.[1] It may be added parenthetically that the use of these viruses has not proved of material value in the destruction of rodents and is open to the serious sanitary objection that the animals after apparent recovery may continue to carry the bacilli of the virus and so contaminate food. On the whole, the agency of rats and mice in causing food poisoning outbreaks had hardly been given due weight. It will be found the most plausible hypothesis in numerous instances where other sources can be definitely excluded.

Perhaps the best way of preventing those types of food poisoning that are due to an infected condition of food animals is, first of all, inspection of the living animals giving milk or destined for slaughter. If this is done, ailing animals will in most instances—although not invariably—be detected. In any event, examination of the live animal is likely to be much more efficacious in discovering infection than examination of the milk or meat. An additional safeguard—and one which is desirable on other grounds—is the thorough cooking of all foods of animal origin. The protection of food, cooked or uncooked, from occasional contamination with vermin is not an easy matter either for country or city dwellers. It is, however, a question that will undoubtedly receive more attention in the near future from health authorities, particularly as regards conditions in restaurants, hotels and public institutions. The use of bacterial rat viruses should be prohibited.

(5) *Food Spoilage.* It has long been a seductive hypothesis that, during the course of the decomposition of food substances, poisons are generated and that much so-called food poisoning is due to the poisonous products of bacteria. This opinion has found expression in many civilized countries in official enactments prohibiting traffic in decomposed meats, vegetables and fruits. The interpretation of the conventional legal phraseology has, however, given full play for expert ingenuity. Just what constitutes a foodstuff "filthy, decomposed or putrid" is a question on which there may be totally different conceptions in the minds of witnesses, experts, lawyers, judge and jury. In point of fact, as every one knows, partly decomposed foods are consumed every day, often in

[1]Spray, R. S:. Jour. Infec. Dis., 1920, 26, p. 340.

large quantities, without evidence of injury. Many kinds of cheese are valued chiefly for the particular decomposition products that they contain. Well-ripened Brie, or Camembert cheeses are evidently far advanced in decomposition. The Chinese delicacy known as pidan consists of preserved duck eggs that have been stored for months in a paste of lime, salt, wood ashes and tea. Much decomposition of protein has taken place in these eggs as indicated by the amount of ammoniacal nitrogen that they contain, which is considerably higher than in the eggs known to egg candlers under the unsavory name of black rots.

It is plain, therefore, that bacterial growth in substances used for food is not necessarily injurious, and that in some cases it may increase the palatability of food without demonstrably impairing its wholesomeness. In recent years natural and artificially soured milk has been expertly recommended and widely used as a food or beverage for persons in delicate health in spite of the fact that it contains many millions of bacteria and their decomposition products.

At one time a particular class of decomposition products, the alkaloidal substances known as ptomaines were supposed to be responsible for many cases of food poisoning. These ptomaines are split products arising from the decomposition of the protein molecule; some of them are undoubtedly poisonous. It seems quite unlikely, however, that they are concerned in any great degree, if at all, in the causation of food poisoning. They do not usually begin to appear until putrefaction has been in progress a week or more. As Savage[1] expresses it: "Under ordinary commercial conditions no one would be stupid enough to vend such food, no one would be rash enough to eat it."

It is true also that belief in the toxicity of ptomaines rests upon inoculation experiments and that, so far as I know, feeding experiments with ptomaines prepared from decomposed meat have never been carried out. While the diagnosis of ptomaine poisoning has its uses as a convenient refuge from etiological uncertainty, it can hardly serve as a precise designation of an actual pathological event. It is highly significant that with the advance in our knowledge of food poisoning and its causation there are fewer and fewer cases in which the diagnosis of ptomaine poisoning is warranted. The majority of the carefully investigated outbreaks of acute gastro-intestinal disturbance of the type that at one time were denominated ptomaine poisoning are now found to be associated with the presence of bacilli of the paratyphoid group. Indeed, that ptomaines possess any practical significance has yet to be demonstrated.

In contrast to ptomaines, which are non-specific, are derived from the splitting of proteins and are not the direct products of bacterial metabolism are those poisons which, like tetanus and diphtheria toxins, are specific to the microbes that produce them. The poison ergot is generated by a fungus attacking rye, as has long been known; the use in times of

[1] "Food Poisoning and Food Infection". Cambridge, England, 1920, p. 116.

famine of the rye in which this fungus growth has taken place gave rise in the Middle Ages to extensive outbreaks of a disease designated as "saint's fire" or "the fire of Saint Anthony"; over 40,000 persons were said to have perished from this cause in an outbreak in Limoges in the Tenth Century.

The question of a specific formed poison in food has come up especially in connection with the paratyphoid group. There seems little doubt that in many—perhaps most—of the food poisoning cases associated with these bacilli, infection or probable infection with living paratyphoid organisms can be demonstrated. There remains a residue of cases, however, in which living organisms have not been found either in the suspected food or in the tissues of the patient. There are some instances too where violent gastro-intestinal symptoms have appeared within so short a time after the incriminated food had been eaten as to suggest the direct action of poisonous products rather than an infective process. Experiments in feeding animals with dead paratyphoid bacilli, with culture filtrates or with incriminated food have not been conclusive although there is abundant evidence that the bacterial products when injected parenterally are toxic. Since the paratyphoid poisons are heat resistant, it has been surmised, especially by Savage and White,[1] that they may persist for a long time even after food has been subjected to thorough cooking. In this way the authors cited would explain the occurrence of certain food poisoning outbreaks in Great Britain attributed to the use of canned South American meat. The matter is extraordinarily difficult for experimental verification since not only is the epidemiological evidence often incomplete so that there is doubt about the incriminated food article, but also, as already stated, the feeding of animals is quite negative. The method of testing the patient's serum for its agglutinative action against suspected paratyphoid strains seems inapplicable here, since it is well established immunologically that the introduction of heat-killed (100° C.) bacilli into the alimentary tract fails to give rise to agglutinins in demonstrable quantity. There seems indeed at present no satisfactory evidence of the truth or falsity of the hypothesis that heat-resistant paratyphoid toxins—using this term broadly—are the cause of food poisoning.

At the present time the most important, as well as the best studied, example of food poisoning due to a bacterial product is botulism. In this disease the active poisonous substance is a true toxin which may be produced in food substances, is destroyed by heat, is potent in extremely minute doses and gives rise to a specific antitoxin. The toxin of Clostridium botulinum is in fact strictly comparable immunologically with the toxins produced by the tetanus and diphtheria bacilli. Unlike the latter, however, it is dangerous when swallowed. Fortunately the conditions under which the botulism toxin is produced are somewhat unusual.

[1]Medical Research Council, Special Report Series No. 92. London, 1925.

Strictly anaerobic conditions are necessary, the reaction of the medium must be suitable, temperature and composition of the medium are important determining factors; the presence of certain saprophytic microbic species such as Clostridium sporogenes may interfere with toxin production.[1] It is not surprising, therefore, that botulism poisoning is relatively very rare despite the fact that the germ itself is quite widely distributed in nature. The name botulism (Lat. botulus = sausage) must now be recognized as somewhat inappropriate since, although some of the earliest outbreaks were traced to sausage, the majority of recent cases, at least in the United States, have been due to canned vegetables, such as corn, string beans and spinach.

Botulism has always been one of the rarest of known diseases and affects only exceptionally an individual or a small group. The dramatic suddenness of its onset and its high fatality have, however, made it a conspicuous and much dreaded malady. From 1912 to 1917 records of 28 outbreaks of botulism were obtained in the United States and Canada. The greater attention that began to be paid to this disease about 1917 perhaps caused an increase in the number of recognized cases put on record. Other factors, however, may have been concerned. At all events the years 1918-1923 were marked by a considerably larger number of reported outbreaks than the preceding six years.

NUMBER OF REPORTED OUTBREAKS OF BOTULISM

1912-1917	28
1918-1923	83
1924	8
1925	8
1926	3

Since 1923 there has been a definite reduction in the number of reported outbreaks, there being but 16 outbreaks in 1924-1925 as contrasted with 33 for 1922-1923. In 1926 there were only 3 outbreaks reported, one due to home-canned asparagus, one to home-canned fish, one to home-canned string beans. Since 1917 our knowledge of botulism has been greatly extended by the researches of Dickson, Meyer, Geiger, Bengtson, Bronfenbrenner, Esty, Dack, Starin and many others.

One of the remarkable features of botulism is its singular distribution. Of 56 outbreaks of botulism in the United States recently tabulated,[2] 49 of which occurred during 1922-1926, it is said that 46 occurred in the Western States; in 4 of the 7 outbreaks reported in the Middle West, the food was canned in the Western States. Corresponding with this distribution of cases, the specific microbe has been found with particular abundance in the soil of certain regions, notably the Rocky Mountains

[1] Jordan, E. O. and Dack, G. M.: Jour. Infec. Dis., 1924, 35, p. 576.

[2] Jour. Am. Med. Assn., 1926, 86, p. 482.

and Pacific Coast States; it is less frequent in the Atlantic States and relatively rare in the region of the Great Lakes and Mississippi Valley.[1] In Canada soil samples in significant numbers have been examined from only three localities: the neighborhood of Vancouver, the Canadian Rockies (Glacier, Lake Louise) and the Province of Quebec. Clostridium botulinum was found in a large proportion of the samples collected in the two former localities (31 per cent. of the Glacier samples), but was absent in the 16 samples from the Province of Quebec.[2] There seems to have been but one outbreak of botulism reported in Canada[3]—near Dawson City, Yukon—and nothing is certainly known about the causative food. If, as thought possible, commercially canned beets were responsible, they were doubtless prepared at some distant point.

Botulism outbreaks have been reported in Germany, Belgium, Switzerland and other European countries. The first recognized outbreak in Great Britain occurred at Loch Maree, Scotland, in 1922. No systematic soil surveys have been made in Europe, but scattered observations show botulinum spores to be widely distributed in the soil in Belgium, Denmark, Holland, Switzerland and England. The question naturally arises why botulism has not occurred more frequently in England and some other countries if the spores are actually present in the soil. While the answer to this question is not wholly clear, some of the perplexing factors of botulism may be explained by the relative numbers of botulinum spores in different localities. As a rule, the spores are decidedly less numerous in European than in American soil specimens.[4] They are apparently more abundant in the Rocky Mountain soils than in other parts of the United States. Another significant fact is that there are two immunologically distinct varieties of Cl. botulinum designated provisionally as Type A and Type B. Type A has been much more frequently isolated than Type B in the outbreaks of botulism in the United States; it also was isolated from the wild duck paste that caused the Loch Maree outbreak in Scotland. Type A is more commonly found in the soils of the Rocky Mountain region, Type B in the Mississippi Valley and the Atlantic States. Only Type B was found by Meyer in European soils. A third Type—Type C—has been especially studied by Dr. Ida Bengtson of the U.S. Health Service.[5] It is much less heat-resistant than the other strains and has not been causally associated with any of the reported outbreaks of botulism.

The interrelationship of these three immunologically distinct types of Clostridium botulinum is not clearly understood. It has been con-

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[1]Meyer, K. F. and Dubovsky, Bertha J.: Jour. Infec. Dis., 1922, 31, p. 559.

[2]Dubovsky, Bertha J. and Meyer, K. F.: Jour. Infec. Dis., 1922, 31, p. 595.

[3]Glancy: Canadian Med. Assn. Jour., 1920, 10, p. 1027; abstr. by Geiger, Dickson, and Meyer: Public Health Bull. No. 127, 1922, p. 47.

[4]Meyer, K. F. and Dubovsky, Bertha J.: Jour. Infec. Dis., 1922, 31, p. 600.

[5]Bengtson, Ida A.: Hygienic Laboratory Bull. No. 136, 1924.

jectured that the B type is a degenerate descendant of the more highly toxic and resistant A type, but proof of this connection is still lacking. Why Type A should be so abundant in the virgin uncultivated soil of certain regions is a mystery as yet unsolved.

The association of the several botulinum organisms with various animal diseases presents an interesting but complicated problem. Varying degrees of susceptibility to the toxin of the different types undoubtedly exist, chickens, for example, being much more susceptible to Type A toxin than to either B or C. Both B and C toxins are, nevertheless, highly toxic. The disease known as "limberneck" in chickens may be caused by the consumption of the larvae of the green fly (Lucilia caesar) which contain botulinum organisms or botulinum toxin. Ida Bengtson has shown that Type C is frequently implicated in these natural outbreaks in chickens. Limberneck may also result when chickens feed upon the remnants of spoiled canned foods thrown out on the ground in the barnyard. A number of human outbreaks of botulism have been traced to their source through the evidence afforded by outbreaks of limberneck. It is still uncertain how far botulinum toxin is responsible for cases of "forage poisoning" in horses and other stock animals. Observations reported by Seddon from Australia and by others in various parts of the world have not led to a unified scientific judgment. Since Clostridium botulinum is a common soil organism in many localities, its presence in the animal intestines or even in the internal organs after death is not conclusive evidence that death was due to botulinum intoxication.

The question has been frequently asked whether Cl. botulinum is, strictly speaking, a pathogenic organism, whether it can grow and generate toxin within the animal body. The conclusion of some of the earlier investigators that this organism "is absolutely incapable of reproducing itself in the animal body" seems to have been overthrown by more recent and more extensive studies. Especially the experiments of Coleman and Meyer[1] and of Starin and Dack[2] show that carefully detoxified spores are capable of germination in the bodies of laboratory animals, that spores and vegetative forms become widely disseminated through the tissues and that toxin is formed in sufficient quantity to cause death. It seems most unlikely, however, that under natural conditions tissue invasion by living botulinum organisms plays any part in the causation of botulism in man. Massive doses must be used to produce this effect upon experimental animals and there is no authentic instance on record of the development of botulism in human beings except when formed botulinum toxin has been taken into the alimentary tract.

The symptoms of botulism are strikingly different from those of paratyphoid infection: onset is less sudden, gastro-intestinal symptoms are relatively rare, temperature is subnormal and there is seldom any

[1]Jour. Infec. Dis., 1922, 31, p. 622.
[2]Jour. Infec. Dis., 1925, 36, p. 383.

abdominal pain; especially characteristic of botulism are the disturbances of vision and the difficulty in swallowing; the mortality in botulism averages over 60 per cent. as contrasted with about one per cent. in demonstrated paratyphoid infections. Preserved foods are to be suspected, particularly when signs of spoilage are present. If samples of the incriminated foods are available for examination, toxin tests controlled with specific antitoxin should be made.

The treatment of botulism is not on a satisfactory basis. In the first place, while botulinum toxin is unique in being the only known exotoxin that is absorbed from the digestive tract, there are many essential things about its absorption and its action that are still quite obscure. Experimental animals, although susceptible to feeding, are much more susceptible to subcutaneous or intraperitoneal injections. Different animal species evince marked differences in susceptibility, these differences being especially marked with respect to poisoning by mouth. Mice are very susceptible to subcutaneous inoculation, but show no effects when much larger doses of toxin are given by mouth.[1] Swine are resistant to enormous doses of toxin given by mouth; as much as 10,000,000 MLD (for mice) have been given without ill effect.[1] Rabbits and guinea pigs are quite susceptible to oral administration. The conditions affecting the permeability of the intestinal wall to botulinum toxin are not understood. Dack and Gibbard[2] have shown that only a very small amount of toxin could be demonstrated in the venous blood from a perfused loop of intestine containing toxin, and that there was no noteworthy difference between the highly resistant hog and the relatively susceptible rabbit in this respect.

In the second place the obstacles to successful antitoxin treatment are very great. While true, specific and—in animal experiments—therapeutically efficacious antitoxin can be produced just as in tetanus and diphtheria, the time necessary to produce an antitoxin of even moderate potency is very great, and may be as long as six months. This adds to the expense of producing antitoxin on a commercial scale and is a barrier to its general distribution. The therapeutic need of prompt administration is even greater in botulism than it is in tetanus and diphtheria since a large amount of the toxin is usually introduced into the body at one time instead of being, as in the latter diseases, absorbed slowly from the site of infection. Prompt administration is, however, peculiarly difficult to achieve. Many of the outbreaks have occurred in thinly settled regions where botulism antitoxin is quite unavailable. Sometimes the course of the disease is very rapid; in the Loch Maree outbreak two of the victims died within 18 hours after the first appearance of symptoms. A further difficulty in providing for antitoxin treatment is that the types of organism are immunologically specific. Type A antitoxin does not protect

[1]Dack, G. M. and Gibbard, J.: Jour. Infec. Dis., 1926, 39, p. 173.
[2]Jour. Infec. Dis., 1926, 39, p. 181.

against Type B toxin and vice versa. When botulism symptoms appear there is no time for type differentiation; to be on the safe side a polyvalent serum should be given. All these difficulties render the successful application of antitoxin treatment to botulism highly problematical. Indeed, the administration of botulism antitoxin in human cases cannot yet be said to have had a fair trial in a single instance. Other modes of treatment have been suggested. Dickson and Shevsky[1] have observed that the toxins of both Types A and B exert an influence upon the endings of the motor fibers of the voluntary nervous system which leads to a marked susceptibility to fatigue. Since death from botulism is practically always due to failure of the respiratory muscles or the heart, more often the former, any means for conserving muscular strength may be serviceable. Bronfenbrenner and Weiss[2] have advised that patients be given morphine for this purpose, a procedure that seems to be justifiable if dosages that tend to depress the respiratory functions are avoided. For the present, measures of prevention seem more hopeful than those of cure.

Fairly effective measures to prevent botulism may be taken. These fall into two groups, those concerned with the initial methods of preservation and those having to do with the inspection and treatment of the food before serving. Since the spores of Clostridium botulinum apparently get into foods chiefly from the soil, measures of cleanliness are strongly indicated. It may be safely predicted that painstaking attempts to free vegetables from soil particles before canning will be rewarded by a greater freedom from botulism. In those regions where botulinum spores are particularly numerous in the soil such precautions are especially necessary. The most serious difficulty is due to the high heat resistance of the botulinum spore. While the majority of spores are killed at the ordinary temperature at which foods are canned or processed, certain strains apparently possess an abnormally high resistance and may survive the usual heating procedure. Esty[3] found that the heat resistance of 81 Type A strains at 105° C. varied from 3 to 75 minutes. It is evident that at high altitudes where water boils at temperatures considerably under 100° C. especial care is necessary in attempting to process foods by heat. Experiments upon the degree of heat and time of exposure necessary to kill even the most resistant forms and upon heat penetration in different foods have shown ways of reducing the likelihood that any botulinum spores will survive large-scale, carefully controlled processing.

The second group of safeguards is likewise quite efficacious. Nearly all—some investigators would say all—canned foods implicated in botulism afford to the senses unmistakable evidences of being spoiled. There is no doubt that the instant rejection without tasting of any preserved

[1]Jour. Exper. Med., 1923, 38, p. 327.
[2]Proc. Soc. Exper. Biol. and Med., 1922, 19, p. 296.
[3]Am. Jour. Public Health, 1923, 13, p. 108.

food that gives the slightest indication of spoilage would practically do away with the menace of botulism. Finally it is worth noting that the botulism toxin is readily destroyed by boiling and that in consequence the custom—already followed quite generally—of heating canned foods before serving interposes still another barrier to botulism poisoning. Rare as botulism is at the present day, there is the best of reasons for believing that it can be entirely eliminated by application of the measures just described. The progress already made is most encouraging.

The brief sketch that I have attempted here of the main types of food poisoning will serve its purpose if it gives you, however imperfectly and fragmentarily, some conception of the extent and complexity of the problem. Here as elsewhere, we need more knowledge and ever more knowledge. Looking back we can see that great advances have been made, looking forward there is still much for us to accomplish. As Francis Bacon expressed it, that which men have done is "but an earnest of the things they shall do."

THE SUB-STRUCTURE OF PUBLIC HEALTH*

L. A. THORNTON, B.Sc.
City Commissioner, Regina

WE are all aware of the importance to the individual of good health. It is only when the body is kept in fit condition that it is possible to attain that soundness of mind which is so essential to a full life. As it is with the individual so it is with the state of the community. The public health is an exceedingly important consideration. It would be interesting to discuss if time would permit the influences which have brought about this remarkable growth of interest in public health matters in the last 100 years. I venture to say that one very important cause has been the change in the political condition of the people. Wherever the freedom of the subject has been asserted the right to the individual to be provided with an education and with equal opportunities to others in the state has brought into prominence the assertion of the value of human life and the demand that adequate steps be taken to conserve this value. It is because of my connection with municipal government and training as an engineer that I venture to advance you these few words; first, to congratulate your organization upon the most valuable services which it is rendering, and in the second place to indicate in a brief way that the engineering profession is closely allied with the profession of medicine in this very important subject of public health, and that in fact the contribution of the engineer may be claimed to provide the sub-structure upon which the wonderful organizations of public health which we know have been erected.

All governments in free countries are required to recognize the importance of public health and have set up departments to prosecute its interest. With better education and more opportunity to discuss the available means to combat disease it would appear that there is no limit to the extent to which the public is prepared to go to protect public health, and it is interesting to note that in every public health organization of any size the engineering department occupies an important position.

In all our discussions of health measures we start with the statement that for good health it is essential that fresh air, good food and drink be provided, and I would confine myself to a brief reference to the engineering connection with the provision of these three essentials. The discussion of public health as applied to the resident in the rural districts would be a profitable one, but the present discussion will be directed more particularly to public health measures as applied to the more closely settled urban communities. In these communities where people are so closely related the opportunity for the

spread of infections and contagious disease is so great and its consequences so dire that it is in these communities that the chief interest has been shown. A very important provision is the proper city plan, and our engineers are required to give attention to many essential needs of the community in the draft of this plan. Provision must be made to prevent the growing of the settlement into such close quarters that light and air shall be available in adequate proportions. Provision must be made for the transportation of the inhabitants and the merchandise which they require, and adequate provision must be made for the supply of plenty of water and the disposal of waste products of the body and the household and industrial occupations of the community. The importance of City planning is becoming more and more apparent, and governments are requiring municipalities to adopt adequate measures along these lines.

In this day it is an accepted fact that there should be an adequate water supply, but it is interesting to note that the provision of a water supply as understood in our own day is a comparatively recent development. There are so many purposes to which the water supply can be put that there is an ever-increasing demand. In the household the water is used for drinking, cooking, cleansing and as a carrier for the house wastes. In industry there is comparatively no limit to the extent to which water may be required for processes of manufacture. This demand for a good clean water in great quantities has imposed upon the engineer one of his chief problems and the expenditures made by any community on water supply represent possibly as large a proportion of the total expenditure as for any other service. It is of interest to note that by careful study of the problem the needs of a community in this connection are now supplied at remarkably low cost, the cost which could not be attained if it were not for the magnitude of the operations. Water is supplied at the tap at a good pressure at an average cost of less than five cents per ton. The processes of purification and clarification of water supply involves highly technical study on the part of the engineer and the delivery of the water also implies careful study.

As has been hinted water is used in so many ways in our modern life that there is not only the problem of the supply, but the problem of the disposal of the spent water and hence we have our sewerage systems. Sewerage is a waste product, it is of no value but its disposal faces us with many problems. It is interesting that the first sewer systems were intended to carry away storm water, but with the growth in appreciation of the need for adequate health measures water was adopted as a means of better sanitation in the homes and in our stores and factories, and the domestic sewer followed as a result. In the disposal of waste water carrying all the waste products which go to make up the sewage of a community the only means is to deliver it to a waterway. Immediately we have the problem confronting us of protection to life, both human and animal, which is dependent on this waterway for its water supply. Where there is an opportunity to dispose of the water under conditions that the dilution is so great that there is little danger of contamina-

tion of the whole body of water, the problem of sewage disposal is not so acute, but unfortunately this condition is not universal and particularly in this western country sewage disposal constitutes a very serious and expensive problem for the community. The ideal of the engineer is, of course, to purify the sewage so that the waste water will return to the waterways pure, but the practical considerations of cost, etc., limit the possibility as far as present methods are concerned, to a condition in the sewage which renders it inert. Before we leave the question of sewage disposal we might note that the great variety of manufactures gives rise to just as great variety of wastes, all of which are liable to have deleterious action on sewer pipes and on the process of sewage purification, so that the engineer is also faced with the problem of controlling to a great extent the manner in which the individual industry disposes of its waste.

There is one other essential to life and health which was first mentioned, namely, good food. We know that the problem of food preservation has always faced civilization. America was discovered as a result of an adventure in search of spices, which were then used for preserving food. Food spoils if it is subjected to dampness or fluctuating temperature. With our varied conditions of life food is prepared in enormous quantities in factories, put up in various forms, transported long distances and stored for considerable time all to meet the needs of the individual, and with many food products there is the essential necessity of adopting some means of preserving them. Aside from the adequate provisions for transporting food supply, which is an engineering problem, the mechanical engineer has supplied mechanical refrigeration which has made such a large contribution to the preservation of food, and the possibilities of mechanical refrigeration have become so well understood that its application has not only been in the proportion required for industrial purposes but has become of use for domestic purposes, and the time is not far distant when in our modern homes we will have available effective means of mechanical refrigeration.

There is no more important item of our food supply than the item milk. At the same time, if not properly safeguarded, the milk supply affords a prolific source of danger from disease and everywhere scrupulous care is exercised to regulate the milk supply. It is admitted that in the larger centres the effective safeguard is pasteurization, a process which is made possible in commercial proportion because of the mechanical means available for heating and cooling the product.

These are a few instances of the basic needs of the community in the interest of health and industry to which the engineer makes an important contribution. These needs are so fundamental that we feel that there is ample justification for the assumption that in adequate provision for the said needs the engineer builds that sub-structure upon which our public health organization is raised.

While volumes have been written about each of the fundamentals which have been mentioned, the purpose of the present discussion is merely to cite

them. In my opinion there is still the need for more and more publicity to stress the necessity of the recognition of these as basic considerations in Public Health. If any of them are neglected our very existence as large, closely populated communities is endangered.

The Engineering profession, from its connection with Public Health work, is the first to acknowledge the fact that the medical profession has made and will continue to contribute the greatest impetus and control of this work, and is proud to be associated therein with the medical profession.

*Read before Saskatchewan Health Officials' Convention, Regina, Oct. 28, 1927.

DISCUSSION

By STEWART YOUNG, B.A.Sc., *Director of Town Planning*

I HAVE listened with a great deal of interest to the proceedings thus far, and particularly to that phase of Mr. Thornton's address dealing with Town Planning. This is a subject in which I am particularly interested.

A number of years ago the generally accepted idea attached to the term was that it dealt with the wiping out of the existing order of things and the substitution of a new order at great expense to the community for the sake of civic adornment. This idea has been dispersed. Nowadays we think of Town Planning as a means of providing for the future in such way as to eliminate the necessity for correcting the mistakes of the past. With increasing population it becomes more and more important and difficult to guard the health of the public. Health is sometimes regarded as being the mere absence of disease, but it is something more than this; it is positive, and involves physique and vitality and is mental as well as physical. Medical science has proven that sunlight destroys disease breeding bacteria and assists materially in providing resistance against such disorders as tuberculosis. On the other hand, the lack of sunlight is an increase in eye-strain, which in turn reduces physical resistance to disease. Further, good air conditions are usually possible where there is good natural light, while poor ventilation usually accompanies the dark room.

That function of Town Planning commonly termed "Zoning" aims to provide good light and air conditions about our homes and in our offices and factories. Heretofore the problem of public health, as related to building control, has been attacked in a piecemeal fashion by providing special regulations for such buildings as theatres, hotels and apartment houses. Such regulations are often rendered wholly or partially ineffective by failure to control the environment of the building. The District or Zoning system of regulation makes it possible to provide suitable and reasonable regulations for each class of building throughout the district and at the same time preserve the advantage of substantially uniform regulations.

The engineering profession, on account of its special field of activity, can contribute more than any other profession to the drafting of proper methods of regulation.

EDITORIALS

THE PUBLIC HEALTH JOURNAL

WITH the present issue, the PUBLIC HEALTH JOURNAL, commencing its nineteenth year of publication, appears under such new conditions that it seems advisable to call certain matters in connection with it to the attention of its readers.

THE PUBLIC HEALTH JOURNAL came into existence in 1909, two years before the formation of the Canadian Public Health Association, and for some time was a semi-popular publication. In 1911 it was adopted as the official organ of the Canadian Public Health Association and was carried on by its founders. In 1917 it was taken over by a small group of public health enthusiasts who attempted to create a journal which would be of particular value to health officers, and as a result for a period of some years its lay-out was of a somewhat academic type. Under such conditions the JOURNAL has been carried on for ten years. A creditable publication has been turned out, and a reasonably large circulation has been maintained in spite of the fact that all of the work in connection with the JOURNAL has been voluntary.

Recently the Canadian Public Health Association Executive have felt that the time has come when perhaps the Association could be of more assistance than in the past, and a proposition has been brought forward whereby the responsibility for carrying on the JOURNAL would be taken by a joint Board of Management comprising representatives of the Canadian Public Health Association and the York Publishing Company, which has assumed full responsibility since 1917. It was hoped that under this management the Canadian Public Health Association might be able to take over the JOURNAL at the end of a year. This would involve only a partial remuneration for the small group who have helped to finance it up to the present time.

Such a plan has now received endorsation and starting with the present issue the JOURNAL will appear under the management of the board whose names appear on the title page. The new board desires to express the appreciation of all of the subscribers and supporters of the JOURNAL and the Canadian Public Health Association for the very extensive voluntary services rendered in the past by the gentlemen who have been responsible for the JOURNAL for a number of years now and assures the readers of the JOURNAL that every effort will be made to continue a more than creditable magazine. A large editorial board has been already appointed to supplement the efforts of the board of management. Further announcement as to the policy to be pursued by the JOURNAL will appear in subsequent issues.

G. A. B.

DR. HASTINGS

Recently a movement has been started in the City of Toronto to give some tangible expression to the gratitude which the citizens of Toronto and others feel for the fine work achieved by Dr. Hastings during his tenure of office as Medical Officer of Health.

At the time of Dr. Hasting's appointment to the position the general mortality rate of the city was 15.1, and this has been reduced to 10.2 in 1925. The real significance of this is that there are approximately 2,700 less deaths occurring each year in the city than there would have been had the old conditions persisted. In 1920, 182 babies died within a year of birth, of every thousand born alive. This death toll has been more than cut in two, only 70 deaths per 1,000 now being reported. Similarly, typhoid fever was a very common and prevalent disease at the time of his appointment and now is almost wiped out. In 1924 only 55 cases of typhoid were reported in the city, and of these 41 were known definitely to have contracted the disease somewhere outside. The death rate from tuberculosis has been more than cut in two. The general death rate is lowest of any of the cities with a population of half a million or over on the continent.

There is not space here to go into a complete analysis of what Dr. Hastings has achieved for the City of Toronto. Suffice it to say that during the entire period of his official life he has fought courageously to obtain the support which was necessary in order to give Toronto the health machinery which he knew would reduce Toronto's mortality.

The present plan is to endow scholarships in public health in the University of Toronto, and, in addition, to have Dr. Hastings' portrait painted and presented to the city. This plan will unquestionably meet with the approval of citizens generally, and it is hoped that many of the readers of the PUBLIC HEALTH JOURNAL will do their part in helping to support it. This is a real opportunity to do honour to a man whose career has been an exemplification of the finest things in the field of public health.

G. A. B.

CHILD HYGIENE

H. E. YOUNG, M.D. AND J. T. PHAIR, M.B., D.P.H.

IS THE PREVENTION OF RESPIRATORY DISEASE IN CHILDREN PRACTICABLE?

FOR many years the attention of health workers has been focussed on the problem of lessening the morbidity and mortality rate from respiratory disease in infants and young children. The magnitude of the task is often inadequately realized. We are told that 40% of pediatric practice deals with affections of the respiratory tract. We know that 75% of the cases of primary broncho-pneumonia occur in the first two years of life, and that well over half of the cases of bronchitis are found in the first three years. The continuance of conditions which make such statements possible is a perpetual challenge to those to whom the public are accustomed to look for leadership in all matters pertaining to health.

Less than a generation ago illness and death from acute disturbances of the digestive tract in young children were extremely common, as common relatively as those now associated with respiratory disease, and the condition was accepted as inevitable. To-day the existence of such conditions is looked upon as a reflection on the community in which they exist. What factors were responsible for the change?

The dispelling of ignorance and the breaking down of age-old customs, and the establishment of health practices that were based on sound, scientific experience was accomplished in an incredibly short space of time. The means adopted was comparatively simple, namely, the widespread dissemination of the available knowledge of the subject, and the non-technical presentation of a specific programme of prevention in terms that were readily understood, and the practicability of which was amply demonstrated.

The same forces which accomplished this remarkable achievement in the field of digestive diseases are available for any campaign against respiratory disease, why then have they not been set in motion?

The first requisite for success in any programme of this kind is the practicability of its application. It must be based on absolutely accurate knowledge. The measures advocated must be easy of adoption, within the reach of all, and their value must be convincing to the most uninitiated. It should be possible to say, for example, without fear of contradiction, that as the result of exposure to the "common cold" a given number of children die of pneumonia each year; that there is a definite relationship between minor respiratory disease and pulmonary tuberculosis; that severe affections of the respiratory tract are more common among children with physical defects of the nose and throat.

Thousands of children spend their sleeping hours in rooms from which fresh air is deliberately excluded. Is respiratory disease more prevalent among these than among those sleeping in well ventilated rooms? Each one of the so-called desirable health practices must be interpreted into terms of their direct reaction on the disease in question, and their relationship clearly stated. To what extent does satisfactory nutrition, contact with a known case of pneumonia, or exposure to changes in temperature influence the rate of respiratory disease among children? The field workers of any health agency, voluntary or municipal, must have the answers to such questions literally at their finger tips.

My neighbour laughs at me because I refuse to take my children into crowded places during the season when respiratory disease is prevalent. Are his children more likely to contract pneumonia than mine? You say "yes". Is your evidence sufficiently convincing to influence a change in the habits of the family concerned?

We are reasonably sure that the wearing of abbreviated socks and sandals in unseasonable weather is detrimental to the health of the children; that over-heating of school rooms and homes influences the respiratory disease rate; that early isolation of the individual suffering from a cold is desirable; that the use of cold sponging, cold baths, douching, etc., in an effort to "harden" children is harmful; that going to bed immediately the first symptoms of respiratory disease present will, in many instances, limit the extent of the disease; yet to what extent have we influenced public opinion in favour of the adoption or rejection of these practices?

Let us carefully survey our knowledge of the influencing factors, discard those which are based on surmise, select those which are proven, and which, when presented, will carry conviction, and then enlist all available agencies in an effort to arouse public interest.

EPIDEMIOLOGY AND VITAL STATISTICS

A. C. Jost, M.D., and Neil E. McKinnon, M.B.

SMALLPOX IN ONTARIO.

During the year 1927 1,523 cases were reported as compared with 706 in 1926, and 218 during the year 1925. The disease was epidemic in several centres during the fall months. Ottawa reported 114 cases in October, 97 in November and 122 in December. Toronto reported 13 in October, 59 in November and 75 in December. North York and East York townships, adjoining Toronto, with a mixed urban and rural population of 30,000 and 25,000 respectively, reported 22 and 79 cases. Two deaths only have been reported during the year as the disease has been of a mild form.

TYPHOID IN ST. LEONARD, NEW BRUNSWICK.

Information has been received that during November and December the town of St. Leonard (Pop. 1921 census, 1,172) suffered a severe typhoid epidemic. Approximately two hundred cases were reported. The epidemic was considered to be waterborne. Investigation showed the occurrence of earlier cases on the watershed above the town, and heavy fall rains may have been a factor in aiding the pollution of the water.

COMMUNICABLE DISEASES, ONTARIO, 1927.

The following table gives the reported number of cases and deaths from the "notifiable" diseases in Ontario for the year 1927, and furnishes also for comparison similar data for the preceding year.

REPORTED CASES AND DEATHS DUE TO NOTIFIABLE DISEASES IN ONTARIO, 1926 AND 1927.

Disease	1927		1926	
	Cases	Deaths	Cases	Deaths
Diphtheria	3,346	205	2,818	179
Scarlet Fever	6,289	42	5,640	38
Measles	13,405	19	18,420	42
Whooping Cough	3,486	29	3,679	67
German Measles	4,214	4	3,223	..
Mumps	5,035	..	1,784	..
Chicken Pox	8,401	..	7,787	..
Smallpox	1,523	2	706	3
Poliomyelitis	51	15	71	6
Encephalitis	16	12	21	16
Epidemic Meningitis	39	25	37	23
Influenza	179	156	..	388
Pneumonia	160	1,488	..	2,169
Tuberculosis	1,534	732	1,660	821
Diarrhoea	13	4	..	..
Dysentry	5	22	..	..
Typhoid	767	35	581	32
Paratyphoid	1	..	..	..
Gonorrhoea	1,758	..	1,539	..
Syphilis	1,440	6	1,256	..
Chancroid	36	..	11	..
Conjunctivitis, acute infectious	1	..	..	..
Erysipelas	9	1	..	..
Endocarditis	..	1	..	..
Puerperal Septicemia	..	5	..	..
Septic Sore Throat	32	1	18	1
Rabies	1	..	..	..
Contagious Jaundice	6	1	..	..
Tetanus	2	..	..	..
Goitre	3	3	..	..
Pellagra	..	1	..	..

SMALLPOX.

Reports indicate that smallpox is on the increase in England and Wales. In 1926 there were 10,141 cases reported—practically twice the number reported in 1925. During the period of from January to June, 1927, 9,688 cases were reported. So, too, in the United States smallpox has been more prevalent during the past three years. Figures for 37 States with a population of 88,000,000 persons, available for comparison for sixteen weeks ending December tenth in each year show in 1925 3,171 cases, in 1926 3,908, and in 1927 4,534 cases. In the countries mentioned the disease has been of a mild type. In other countries, however, smallpox of a severe type has been epidemic. Northern Rhodesia, in British South Africa, during the period April 30th to November 4th reported 369 cases with 83 deaths. It is interesting to note that mild smallpox had been epidemic prior to the outbreak of severe smallpox. India still contributes largely to the death toll from smallpox, as more than 23,000 deaths were reported in the period from April 17th to October 15th, 1927. The accompanying table gives the reported monthly incidence of smallpox during the past year in eight provinces of Canada.

CASES OF SMALLPOX REPORTED IN CANADA BY PROVINCES, 1927.

Month	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
January.....		1		124	8	20	28	
ebruary....				93	10	19	56	5
March.....				41	2	5	93	2
April.....				32	3	9	59	3
May.....			2	70	7	20	15	4
June.....			2	70	7	17	26	
July.....			12	97	9	20	58	
August.....			2	60	13	14	17	
September...	1			50	9	68	17	2
October.....	1		15	160	11	36	29	
November...			25	271	17	37	11	
December...			8	381	8	61	12	
Total....	2	1	66	1,449	104	326	421	16

Data is chiefly from weekly reports of the Department of Health Canada and is subject to correction.

POLIOMYELITIS.

Incomplete returns in Canada record the occurrence of 381 cases in eight of the provinces during the past year. Of these 249 were reported in Alberta, 47 in Ontario, and 33 in British Columbia. The Public Health reports (United States) show since September a marked increase over the number of these cases in a similar period in the years 1925 and 1926.

PUBLIC HEALTH ENGINEERING

T. J. LAFRENIÈRE, C.E., and A. E. BERRY, C.E., Ph.D.

ORTHO-TOLIDINE TEST FOR WATER CHLORINATION

THE health official must ever be concerned with the safety of the water supply in his municipality. In the majority of cases this involves some form of treatment of which chlorine is the most common. The dosage of chlorine must be so regulated that it will be adequate to effect its purpose, but not be present in such quantities that it will be objectionable. Different waters require different amounts of chlorine to accomplish the same results, and it is therefore desirable that some measuring rod be available for this purpose.

The difficulties attending the regulation of chlorine dosage by bacteriological analyses have been largely overcome with the introduction of the ortho-tolidine test. This simple colour test is used in practically every plant where chlorination is in practice. It can be applied by any waterworks operator and supplies in a few moments the necessary information which enables him to regulate the flow of chlorine.

Ortho-tolidine tests measure the amount of free chlorine present in the water after some definite period for sterilization has elapsed. In this way there is measured the amount of chlorine necessary for treatment plus a small extra amount or residual. This residual in the presence of ortho-tolidine is indicated by a yellow colour, the depth of which depends upon the amount of chlorine present. It has been shown that in general, when a certain residual is maintained, the water is of satisfactory quality. The longer the water stands the less residual appears and it may disappear entirely before it reaches the consumer. For this reason a definite time is chosen for making the test—usually fifteen minutes after the chlorine has been added. The amount of residual is measured by comparison with certain colour standards of known strength.

The solutions are prepared and the test carried out as follows:

Reagents

(*a*) Ortho-tolidine solution.

Dissolve 1 gram of ortho-tolidine in 1 litre of dilute hydrochloric acid (100 cc. conc. acid diluted to 1 litre).

(*b*) Copper sulphate solution.

Dissolve 1.5 gms. of copper sulphate and 1 cc. of con. sulphuric acid in distilled water and make up to 100 cc.

(*c*) Potassium dichromate solution.

Dissolve 0.025 gms. of potassium dichromate and 0.1 cc. of conc. sulphuric acid in distilled water and make up to 100 cc.

Preparation of colour standards

Colour Standard	Copper Sulphate solution (*b*)	Pot. Dichromate solution (*c*)
0.1 p.p.m.	1.8 c.c.	10 c.c.
0.2 "	1.9 "	20 "
0.3 "	1.9 "	30 "
0.5 "	2.0 "	45 "

Each is made up to 100 cc. with unchlorinated water.

Equipment necessary

3-100 cc. nessler tubes (about 10" long).
1-1 cc. pipette.

Procedure

Take 100 cc. of the chlorinated water in a nessler tube. When it has stood fifteen minutes after the chlorine was applied add 1 cc. of the ortho-tolidine solution. Mix and let stand five minutes. Compare the depth of colour in this tube with the known colour standards in the other nesslers. The comparison should be made by holding the tube over a white surface and between the two standards, looking straight down through the tube.

In most waterworks plants the chlorine residual is maintained between 0.2 and 0.3 p.p.m., after a fifteen minute period. In swimming pools residuals are usually maintained between 0.2 and 0.5 p.p.m. These are the standards of the Ontario Department of Health under regulations passed in 1924. The Ontario Department also provides a small chlorine outfit for campers and others who are using water of unknown or uncertain quality. In this connection the method is simplified and the standards are not used, but an approximate residual is determined by the depth of the colour observed in a white cup.

LABORATORY SECTION

G. B. Reed, M.D. and C. M. Anderson, M.D.C.M., C.P.H.

THE BACTERIOLOGICAL EXAMINATION OF WATER AND INTERPRETATION OF RESULTS.

TWO tests are commonly employed in bacteriological water analyses, namely:

(*a*) Plate counts.
(*b*) Estimation of the degree of contamination with colon organisms (B. Coli).

Significance of Plate Counts

The aim of plate counts is to determine the number of organisms in a definite quantity of sample (1 cc.) which grow at 20° C. (a common water temperature), and at 37° C. (body temperature). Plate counts are of value chiefly when a series of samples is sent from a treated supply, and where it is desirable to compare the results at various stages of the treatment, or to make other similar comparisons. In the Department of Health of Ontario, plate counts are made only when it is considered at the laboratory to be desirable, and when the samples arrive packed in ice.

Why Colon Organisms are Reported

Colon bacilli are bacteria which normally inhabit the intestinal tract of both man and animals. They do not, of themselves, prove that a water contains disease producing bacteria, but serve rather as a warning that dangerous germs or bacteria also of intestinal origin, such as typhoid, paratyphoid or dysentery, may be

present. As colon bacilli always greatly outnumber disease germs in a water, it is usually impracticable to recover the latter by laboratory methods. The detection of colon bacilli in a sample is, consequently, a more practical procedure than attempting to isolate the disease-producing bacteria.

Detection of Colon Organisms

In the examination of water an attempt is made to determine in what quantities these organisms are present. Various amounts of the sample from 50 cc.'s to 1/10 cc. are planted in a suitable food broth. (1 cc. corresponds to about ¼ teaspoonful.) The tubes containing the quantities of the water sample and the food material are then kept at body temperature for forty-eight hours. At the end of this cultivation period it is then determined in what amount of the water sample colon bacilli are present. It is evident that the smaller the quantity of water in which these organisms appear the heavier is the pollution.

A water sample which shows colon bacilli to be present in 1 cc., or less is generally regarded as being heavily polluted. Samples from properly protected or treated supplies show no colon bacilli in any amounts up to and including 50 cc.'s.

Interpretation of Findings

Since contamination may be intermittent and unevenly distributed, water samples frequently show wide variations in the degree of pollution. No supply should be approved on the result of a single bacteriological examination. Sanitary engineers use two methods in particular to determine the quality of a water supply for drinking purposes. These are:

(1) A sanitary survey of the surroundings.
(2) Repeated bacteriological examinations.

In making a sanitary survey it is important to ascertain the possibility of pollution of the water by human excreta, such as from an improperly constructed privy, seepage from a cesspool, or wastes thrown on the ground in the vicinity of the well, or carried by boots and other means to the well covering, where it may be washed into the water. Human pollution is the most dangerous kind, since germs of typhoid fever, paratyphoid fever and dysentery are confined to the discharges of man.

Unfortunately, at present, no laboratory test can be used to distinguish between colon bacilli of human origin and those of animal origin. Drainage from a stable may highly contaminate a spring or well, and the results of the analyses would then appear exactly the same as if the water were contaminated by the more dangerous human pollution. Hence arises the necessity for a sanitary survey.

All water supplies in which colon bacilli are found in such small quantities as 1 cc. should be regarded as being potentially dangerous to health. Such water should be boiled, chlorinated or treated by other recognized methods until the source of pollution has been eliminated and repeated samples prove by bacteriological examination to be of good quality.

In the section on Public Health Engineering there is described the ortho-tolidine test for water chlorination which supplements this article.

NEWS OF NATIONAL VOLUNTARY HEALTH AGENCIES

JEAN E. BROWNE

"THE ideal of medicine is by prevention to defeat disease and lengthen man's days, but still more in the ultimate issue to emancipate the imprisoned splendour of the human spirit and furnish a larger degree of happiness, contentment and capacity." In these sublime words Sir George Newman defines the ultimate aim of all those who are devoting their lives to the promotion of public health.

Toward this end men of science have been working in their laboratories with increasing intensity, trying to disclose the secrets of nature in order to give the world another weapon with which to fight disease. Pasteur and those who followed him down to our own time have made the history of their discoveries read like a great romance until now mankind has theoretical control of most of the great devastating diseases.

Of recent years, these discoveries have been given practical application by corps of medical officers of health, sanitary engineers and public health nurses. Their achievements have been indelibly written into our civilization. But these hard-working, scientific, vigilant guardians of the health of the community feel most keenly the present stage of passive resistance to their efforts. Some years ago it was an active antagonism that they had to combat. Now the position is that, to quote Sir Napier Burnett: "On the one hand we have a mass of accumulated knowledge due to scientific research on the nature and causation of disease, all of which leads up to a frontier where it remains, —while, on the other hand, we have the great body of the people who in their ignorance become the victim of avoidable disease."

I think all experienced public health workers agree that it requires more than their own herculean efforts to bridge effectively that great gulf between knowledge of the laws of healthy living and the practice of those laws by all the people. To quote again from Sir George Newman: "It is obviously idle and redundant to instruct people how and in which direction they should brush their teeth, if they have no desire or intention of brushing them at all. To arouse enthusiasm and a desire for good health, to awaken a health conscience, this may be called the stimulative function of a voluntary organization."

We have in Canada several great national voluntary organizations that are discharging this "stimulative function" and in so doing are strengthening immeasurably the hands of the constituted authorities. The editorial board of the PUBLIC HEALTH JOURNAL, recognizing the important place of these voluntary organizations in the promotion of public health in Canada, have placed at their disposal this section in the JOURNAL in order to record their aims, activities and developments from time to time.

NEWS FROM THE PROVINCES

A committee of outstanding citizens, both medical and laymen, has been formed in Toronto for the purpose of honouring in a definite way Toronto's veteran medical officer of health, Dr C. J. O. Hastings. This will take the form of the presentation of a portrait and also of the establishment of "The Hastings Scholarships in Public Health" in the University of Toronto. The idea originated among private citizens, indicating an ever-growing consciousness of the importance of public health measures on the part of lay people. The committee appeals not only to Toronto citizens and to the medical profession, but to all those interested in public health work.

Subscriptions should be sent to Sir James Woods, 48 Front St. West, Toronto.

Through the cooperation of the Sun Life Assurance Company of Canada, a motor-bus tour to visit institutions in Great Britain, France, and Italy has been arranged for a group of thirty Canadian physicians specializing in tuberculosis and engaged in administrative or sanitorium work. The physicians will visit the Pasteur Institute where they will observe the work carried on with Calmette's B.C.G. vaccine They will attend the National Tuberculosis Association Meeting in London and, also, in Rome the meeting of the International Union Against Tuberculosis.

In connection with the above visit the "Medical Officer (London, Eng.) of Nov. 26, 1927, says in part:

"Our Canadian confreres can rest assured of a hearty welcome in all parts of Europe. What we can give we shall give freely. Nor will the gifts be on our side, for our visitors, too, have much to tell us, which though perhaps not very striking on paper develops in conversations which are the most valuable part of conferences and exchange visits."

The Nova Scotia Medical Society through the Publicity Committee and Radio Committee is broadcasting a series of articles. These articles have been written by members of the profession in Nova Scotia. The broadcasting is done at a regular hour on Sunday evenings from Station C.H.N.S. and a short resume is sent to the provincial press.

At Dundas, Ontario, where the late Sir William Osler, Bart. spent his boyhood, and, of stones gathered from the fields in which he played as a boy, a cairn has been erected to his memory by the Hamilton Medical Society. This cairn was unveiled on December 28th by Dr. Norman Gwyn, a nephew, of Toronto. After unveiling, the memorial was presented by Dr. Woodhall, President of the Hamilton Medical Society to the Town of Dundas—and was accepted by Mayor Caldwell on behalf of the municipality. The inscription on the tablet which faces the highway leading into Dundas, reads: "Erected by the Hamilton Medical Society to commemorate the life of Sir William Osler, Bart., student, philosopher and physician, whose early studies of nature in this vicinity laid the foundation of his career.

He said: 'The master word is 'Work''.'

THE DEATH OF DR. ALLAN ADAMS

Public Health in Ontario will suffer a loss in the death of Dr. Allan Adams who passed away suddenly in Toronto on the fourteenth of this month from pneumonia. Dr. Adams was in the prime of life, in active practice and had always taken a keen interest in tuberculosis and its prevention. He was secretary of the Laennec Society since its inception some years ago and was a most helpful worker. Those closely associated with him will greatly miss his genial and attractive personality and his memory will be an incentive to all those who are devoting so much time and talent to this great movement.

BOOK REVIEWS

D. T. FRASER, B.A., M.B., D.P.H.

Social Factors in Medical Progress. By Bernhard J. Stern. Columbia University Press. Studies in History, Economics and Public Law. Series , pp. 134. $2.25.

Lister opposing the introduction of the aseptic technique; James Simpson and Lawson Tait resolutely setting themselves against Lister's teaching of antisepsis; Helmholtz and Bastian opposing the germ theories of Pasteur; Virchow completely ignoring Semmelweis' teaching in regard to puerperal fever; Sylvius attacking Vesalius for upsetting the theories of Galen, with proofs derived from human dissection; these are but a few of the instances cited in this little volume of the opposition that those propounding new doctrines in medicine had to combat even from the leaders in their own profession.

The author has analyzed here the factors that have retarded the acceptance of new doctrines and discoveries in the field of medicine, both in and out of the profession, classifying them roughly under the headings: psychological, cultural, mechanical and personality. He thus establishes a common basis for the opposition that has been met with by the leaders in medical progress from Vesalius to Pasteur.

This analysis should be of particular value to the forward looking health officer who must be prepared, in his efforts to put in practice the knowledge that is now available in the laboratory, to meet opposition not only from the laity but also, not infrequently from the medical profession itself.

The second part of the book is in reality a plea for the study of the history of medicine as a series of intellectual movements rather than of isolated biographies. The list of medical discoveries which is furnished, made independently by two or more workers as a result of experiment and correlation of existing knowledge, is impressive and bears out his contention that the progress of medicine has been one of the gradual focussing of effort upon one point rather than

the brilliant results of the work of a single genius. The "key" discoveries in medicine must always arouse our admiration, but the dependence of experimental medicine upon development in the fields of biochemistry and physics is as great to-day as has been its dependence and limitation by the existing knowledge in other fields in the past. H. C. C.

The Natural Processes of Healing in Pulmonary Tuberculosis. By Marc Jaquerod, Physician in charge Grand Hotel Sanatorium, Leysin, Switzerland. Translated by J. Denny Sinclair, M.B., C.H.B. (St. Andrews). Published by The Macmillan Company of Canada, Ltd., Toronto, 1927. Pp. 107. $1.75.

This is a short text on the processes of healing in pulmonary tuberculosis, rather cursory in character, but presents a very encouraging picture of the condition.

The subject matter is profusely illustrated by radiographs, some sixty-five in all.

In chapter one the author points out the nature of pulmonary tuberculosis lesions.

The mode of evolution of tuberculous lesion in the lung is described as that of (1) caseous degeneration generally followed by softening and breaking down, (2) fibrous transformation and (3) calcification. Here the author points out the capability of tuberculous lesions to undergo resolution, — a point not generally appreciated, yet a very significant one.

The natural processes of healing in pulmonary tuberculosis are then given as, healing by resolution, healing of cavities and healing by pulmonary retraction and displacement of the mediastinum and calcification. The author believes the latter has only an insignificant influence in the cure of evolutive tuberculosis lesions for generally no traces of calcification are found in radiographs of cured tuberculous patients.

In a chapter devoted to treatment by artificial pneumothorax the author warns against continuing this form of treatment over long periods of time as there is a serious danger in allowing the healthy parts to atrophy in cases where the nature of the lesions would permit a cure by resolution and effacement. M.B.H.

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Orthopaedic Surgery. W. A. Cochrane. MacMillan Co. of Canada. 1926. pp. 528.

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WELLS, A. E. The Provincial Programme for Infant Care. The Canadian Nurse, January 1928, page 8.

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LOUDON, J. C. The Handicapped Child. Hospital Social Service, December 1927, page 525.

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